

## **San Joaquin County Employees' Retirement Association**

**Actuarial Experience Study for  
January 1, 2013 through  
December 31, 2015**

**Produced by Cheiron**

**November 2016**

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November 7, 2016

Board of Retirement  
San Joaquin County Employees' Retirement Association  
6 South El Dorado St, Suite 400  
Stockton, CA 95202

Dear Members of the Board:

The purpose of this report is to present an Actuarial Experience Study of the San Joaquin County Employees' Retirement Association (SJCERA, the Fund, the Plan) covering actuarial experience from January 1, 2013 through December 31, 2015. The report includes analyses and recommendations of economic and demographic assumptions to be used beginning with the January 1, 2016 actuarial valuation.

The purpose of this report is to provide the results of an Actuarial Experience Study of the San Joaquin County Employees' Retirement Association (SJCERA) covering actuarial experience from January 1, 2013 through December 31, 2015. This report is for the use of the SJCERA Retirement Board in selecting assumptions to be used in actuarial valuations beginning January 1, 2016.

In preparing our report, we relied on information (some oral and some written) supplied by SJCERA. This information includes, but is not limited to, the plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

To the best of our knowledge, this report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.

This report was prepared for the SJCERA Retirement Board for the purposes described herein. This report is not intended to benefit any other party, and Cheiron assumes no duty or liability to any such party.

If you have any questions about the report or would like additional information, please let us know.

Board of Retirement

November 7, 2016

Page ii

Sincerely,  
Cheiron



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## SECTION I – EXECUTIVE SUMMARY

Actuarial assumptions (economic and demographic) are intended to be long-term in nature, and should be both individually reasonable and consistent in the aggregate. The purpose of this experience study is to evaluate whether or not the current assumptions adequately reflect the long-term expectations for SJCERA, and if not, to recommend adjustments. It is important to note that frequent and significant changes in the actuarial assumptions are not typically recommended, unless there are known fundamental changes in expectations of the economy, or with respect to SJCERA's membership or assets that would warrant such frequent or significant changes.

### SUMMARY OF ECONOMIC ASSUMPTION ANALYSIS

The specific economic assumptions analyzed in this report are price inflation, wage inflation, COLA growth, and the discount rate. These assumptions have a significant impact on the contribution rates in the short-term and the risk of negative outcomes in the long-term.

The economic assumptions recently adopted by the Retirement Board include a 7.40% long-term rate of return on Plan assets, an annual increase in prices measured by the Consumer Price Index (CPI) of 2.90%, annual wage increase equal to 25 basis points greater than price increases (3.15% in total), and a post-retirement COLA average growth rate of 2.60%.

The discount rate assumption is consistent with the long-term (10-year) capital market assumptions from the Plan's investment consultant, Pension Consulting Alliance (PCA). Other data presented in this report indicate that the discount rate and other economic assumptions adopted by the Retirement Board are reasonable.

However, other investment consultants project lower returns for the next 10 years. We used the capital market assumptions of another investment consultant active in the 1937 Act systems to compute the expected return for SJCERA's target portfolio. Their assumptions indicated a 6.85% expected nominal 10-year geometric return, which reflects a 4.87% expected real return with 1.98% inflation. If the current target asset allocation is maintained and this other consultant's projections are realized, the Plan would experience a pattern of actuarial losses from the assets in the near term, though they may be partially offset by liability gains if wage and COLA inflation rates are below the assumed rates (3.15% and 2.60%, respectively) over the same time period.

### SUMMARY OF DEMOGRAPHIC ASSUMPTION ANALYSIS

This experience study specifically analyzes and makes the following recommendations for the demographic assumptions.

- **Merit salary increases** – Increases to rates at lower service levels, reduction to rates at higher service levels for all members.
- **Retirement rates** – Reduced rates at younger ages for General members.
- **Termination rates** – Minor increases to General rates with less than 20 years of service. Modest increases for Safety members with less than five years of service and decreases after five years of service.

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**SECTION I – EXECUTIVE SUMMARY**

- **Disability rates** – Decrease in Safety rates for members over age 50. Add assumption for members over age 60.
- **Mortality rates** – Adjusted CalPERS base tables, with generational improvement for all members.
- **Other assumptions** – Minor changes to other assumptions, including Safety deferral age, marital assumptions, and COLA timing.

The body of this report provides additional detail and support for our conclusions and recommendations.

**COST OF ECONOMIC AND DEMOGRAPHIC ASSUMPTION CHANGES**

Among the demographic assumptions, the recommended changes to mortality and merit salary increase assumptions have the largest impact on contribution rates. This table summarizes the estimated cost impact – for the General, Safety, and combined membership - of the recommended changes to economic and demographic assumptions contained in this report.

<b>TABLE I-1</b>				
<b>Summary of Changes in Employer Plan Cost from Experience Study Changes</b>				
	<b>General</b>	<b>Safety</b>	<b>Total</b>	<b>Total Employer</b>
	<b>Contribution</b>	<b>Contribution</b>	<b>Contribution</b>	<b>Cost</b>
	<b>Rate</b>	<b>Rate</b>	<b>Rate</b>	
<b>January 1, 2016 before Assumption Changes</b>	\$ 35.68%	72.42%	41.71%	167,539,980
Assumption Change:				
Mortality Rates	1.19%	( 0.09%)	0.99%	4,088,197
Retirement Rates	( 0.21%)	0.00%	( 0.18%)	(596,851)
Termination Rates	( 0.32%)	0.15%	( 0.24%)	(1,049,760)
Disability Rates	0.00%	( 0.21%)	( 0.03%)	(134,489)
Merit Salary Increases	( 1.42%)	( 4.56%)	( 1.95%)	(7,737,960)
Deferral Age	0.00%	0.67%	0.11%	443,925
Marital % and Age Difference	0.35%	0.60%	0.40%	1,569,385
COLA Timing	0.61%	1.03%	0.66%	2,708,086
Withdrawal and Transfer Assumptions	0.26%	0.56%	0.31%	1,283,257
Economic Assumptions	0.94%	1.99%	1.12%	4,472,499
Employee Contribution Rates	0.07%	0.18%	0.09%	358,466
<b>January 1, 2016 after Assumption Changes</b>	\$ 37.15%	72.74%	42.99%	172,944,736

**SECTION II – ECONOMIC ASSUMPTIONS**  
**PRICE INFLATION**

The economic assumptions used in actuarial valuations are intended to be long-term in nature, and should be both individually reasonable and consistent with each other. The specific assumptions analyzed in this report are:

- **Price inflation** – used indirectly as an underlying component of other economic assumptions.
- **Wage inflation** – across the board wage growth used to project benefits and to amortize the unfunded liability as a level percentage of expected payroll.
- **COLA growth** – rate at which inflation-linked post-retirement COLAs are expected to change.
- **Discount rate** – used both to project long-term asset growth and to discount future cash flows in calculating the liabilities and costs of the Plan.

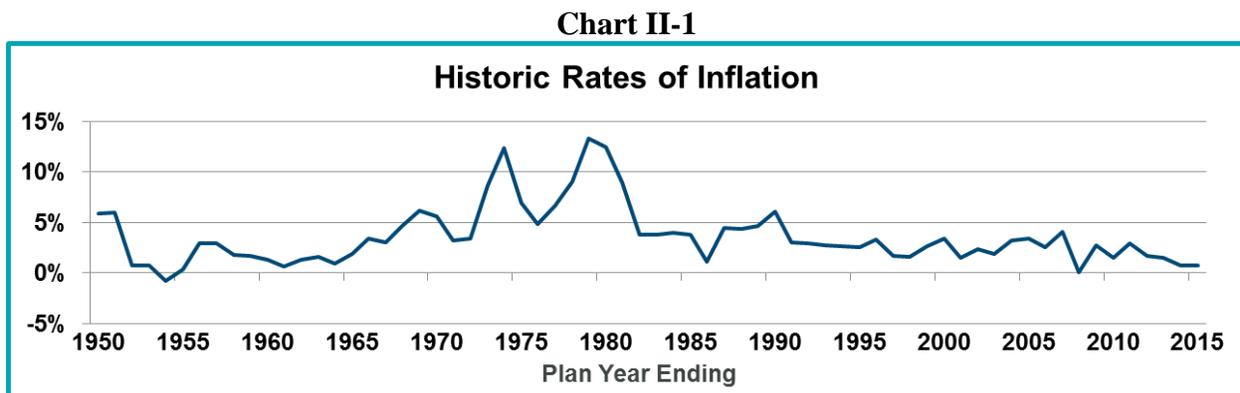
In order to develop recommendations for each of these assumptions, we considered historical data, both nationally and for the Plan, and expectations for the future, as expressed by the Plan's and other external investment consultants and the Board.

**PRICE INFLATION**

Long-term price inflation rates are the foundation of other economic assumptions. In a growing economy, wages and investments are expected to grow at the underlying inflation rate plus some additional real growth rate, whether it reflects productivity in terms of wages or risk premiums in terms of investments.

**Historical Data**

Chart II-1 below shows inflation for the U.S. by individual year since 1950.



Over the 50 years ending December 2015, the geometric average inflation rate for the U.S. has been about 4.1%, but this average is heavily influenced by the high inflation rates in the 1970s

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**SECTION II – ECONOMIC ASSUMPTIONS  
PRICE INFLATION**

and early 1980s. Over the last 30 years, the geometric average inflation rate has been 2.6%, and only about 1.9% over the past 10 years.

**Future Expectations**

A measure of the market consensus of expected future inflation rates is the difference in yields between conventional treasury bonds and Treasury Inflation-Protected Securities (TIPS) at the same maturity. Table II-1 shows the yields on both types of bonds and the break-even inflation rate as of December 2015. Break-even inflation is the level of inflation needed for an investment in TIPS to “break even” with an investment in conventional treasury bonds of the same maturity.

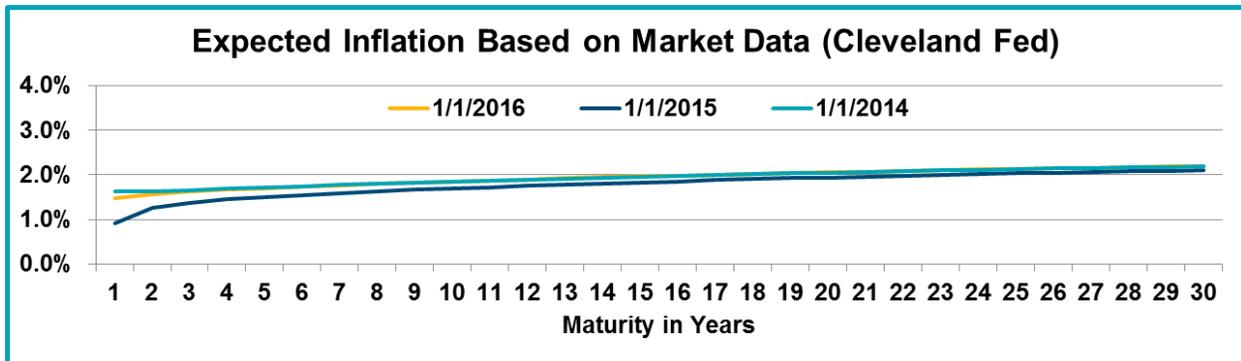
**Table II-1**

<b>Break-Even Inflation Based on Treasury Bond Yields</b>			
<b>Time to Maturity</b>	<b>Conventional Yield</b>	<b>TIPS Yield</b>	<b>Break Even Inflation</b>
<b>5 Years</b>	1.70%	0.46%	1.24%
<b>10 Years</b>	2.24%	0.73%	1.51%
<b>20 Years</b>	2.61%	1.06%	1.55%

Data Source Federal Reserve, Constant Maturity Yields, Monthly Series

The Federal Reserve Bank of Cleveland publishes a forecast of inflation based primarily on this same data, as well as additional information such as inflation swaps and surveys of professional forecasters. Chart II-2 shows a summary of their published expectations as of the last three valuation dates.

**Chart II-2**

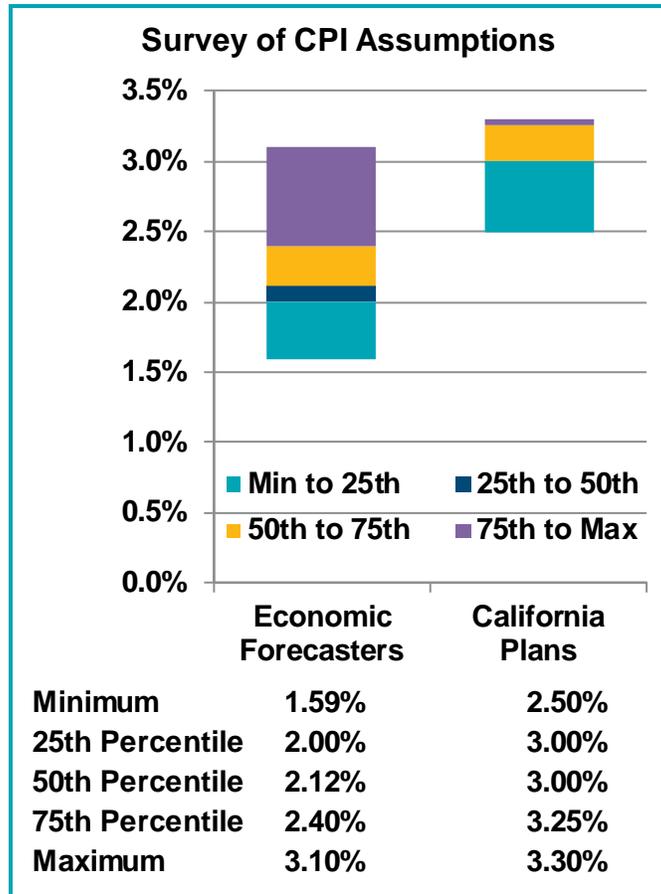


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**SECTION II – ECONOMIC ASSUMPTIONS  
PRICE INFLATION**

The Federal Reserve Bank of Philadelphia publishes a quarterly survey of professional economic forecasters. Chart III-3 shows the distribution of the professionals forecasts for average inflation over the next 10 years compared to assumptions used by California public pension plans.

**Chart II-3**



Finally, PCA, the Board’s investment consultant, uses an inflation assumption of 2.25%, similar to that of many other investment consultants.

Based on all of these considerations, we believe a reasonable range for long-term price inflation for use in the Plan’s actuarial valuations is between 2.0% and 3.25%. Therefore, we agree with the Board’s recent action to reduce the assumption from 3.00% to 2.90%. If, at the time of the next review of economic assumptions, the markets and forecasters continue to indicate lower expectations of future inflation, further reductions in the assumption could be considered.

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**SECTION II – ECONOMIC ASSUMPTIONS  
WAGE INFLATION AND COLA GROWTH**

## **WAGE INFLATION**

Wage inflation can be thought of as the annual across-the-board increase in wages. Individuals often receive salary increases in excess of the wage inflation rate, and we study these increases as a part of the merit salary scale assumption. Wage inflation generally exceeds price inflation by some margin reflecting the history of increased purchasing power.

Wage inflation is used in the actuarial valuation as the minimum expected salary increase for an individual and, for purposes of amortizing the unfunded actuarial liability, the rate at which payroll is expected to grow over the long term, assuming a stable active member population.

Over the past 25 years, mean wage growth (as measured by the Social Security Administration) averaged 0.77% per year. However, over the same time period the increase in the median real wage was only 0.42% per year, as much of the growth in wages was clustered at the top end of the wage scale. Median weekly non-farm wages have increased by only 0.21% from 1985-2015 and by 0.24% from 2005-2015, based on the Bureau of Labor Statistics (BLS) Current Population Survey.

Usually we recommend that long range gains due to productivity, the collective bargaining process or other pressures should be assumed to be zero or minimal. While productivity tends to increase in many sectors of the economy, any long-term assumption of salary growth beyond inflation carries with it an assumed improvement in relative standard of living.

It is acceptable to assume some additional level of base payroll increase beyond general inflation. Potential reasons contributing to the increase may include the presence of strong union representation in the collective bargaining process, competition in hiring among other similar employers, and regional factors – such as the local inflation index exceeding the national average, as has sometimes proven the case in parts of California. Also, historically the US as a whole witnessed 0.9% annual real growth in wages from 1970-2010, and the Social Security Administration projects real wage growth of 0.5% - 1.8% going forward in their Social Security solvency projections. Finally, local governments across the United States have experienced some positive real wage growth over the past 10 years (0.6% per year, based on the BLS Quarterly Census of Employment and Wages).

However, governmental entities remain under financial stress, and other areas of employee compensation – most notably health care costs and pension contributions – have continued to increase faster than the CPI. The Social Security Administration noted in a recent report that the real wage differential has actually been negative (-0.2%) over the most recent economic cycle (2007-2013).

Cheiron agrees with the Board's recent action to maintain a small non-inflationary base payroll growth assumption of 0.25% annually. As a result, the annual expected increase in base payroll would be 3.15%, reduced from 3.25% in the January 1, 2015 valuation. This increase will be applied to all continuing active members, and to starting pay for new entrants when projections

**SECTION II – ECONOMIC ASSUMPTIONS  
WAGE INFLATION AND COLA GROWTH**

of future populations are required. This increase will also be used in the calculation of the unfunded liability amortization payment as a level percentage of payroll.

## **COLA GROWTH**

Members of SJCERA are eligible to receive automatic Cost of Living Adjustments (COLAs), based on the growth in the Bay Area Consumer Price Index (CPI-U) and a 3% cap on the annual COLA increase. Any increase in the CPI above the maximum increase can be banked for future years in which the change in the CPI is below the maximum increase.

It is necessary to determine an assumed rate of COLA growth, reflecting both inflation (i.e. the growth in the CPI), and the interaction of the CPI with the COLA cap and banking mechanism. Simulations of inflation show us that the average growth in the COLA is expected to be below the cap, even if the expected increase in the CPI is equal to or higher than the cap itself. This is because if there is not a significant bank already in existence (such as in the early years of retirement) and there are years in which inflation is below the cap, this shortfall will not be made up in future years.

We have produced statistical simulations of inflation and then modeled how the COLA maximum and the banking process interact with the changes in CPI. For a given long-term estimate of inflation, we used two sets of inputs and then blended the results: a 50% autocorrelation factor with 1.5% annual inflation volatility, and a 25% autocorrelation factor with 1.0% annual inflation volatility. A starting inflation level of 2.25% was used in all simulations, to reflect the low level of current inflation.

Based on a blending of the results under the two sets of inputs, and using the 2.9% inflation assumption adopted by the Board and found to be reasonable by Cheiron, we recommend maintaining the 2.6% COLA growth assumption used in the prior actuarial valuation.

Finally, we note that the actuarial valuation software (ProVal) used by Cheiron has been updated to allow for the specification of an exact date on which COLA increases will be applied, which in SJCERA's case will be April 1 of each year. In prior valuations, a load was applied to the Plan's liabilities to account for the April 1 timing of the COLA; in future valuations, the date of COLA will be reflected directly in the valuation coding.

**SECTION II – ECONOMIC ASSUMPTIONS  
DISCOUNT RATE**

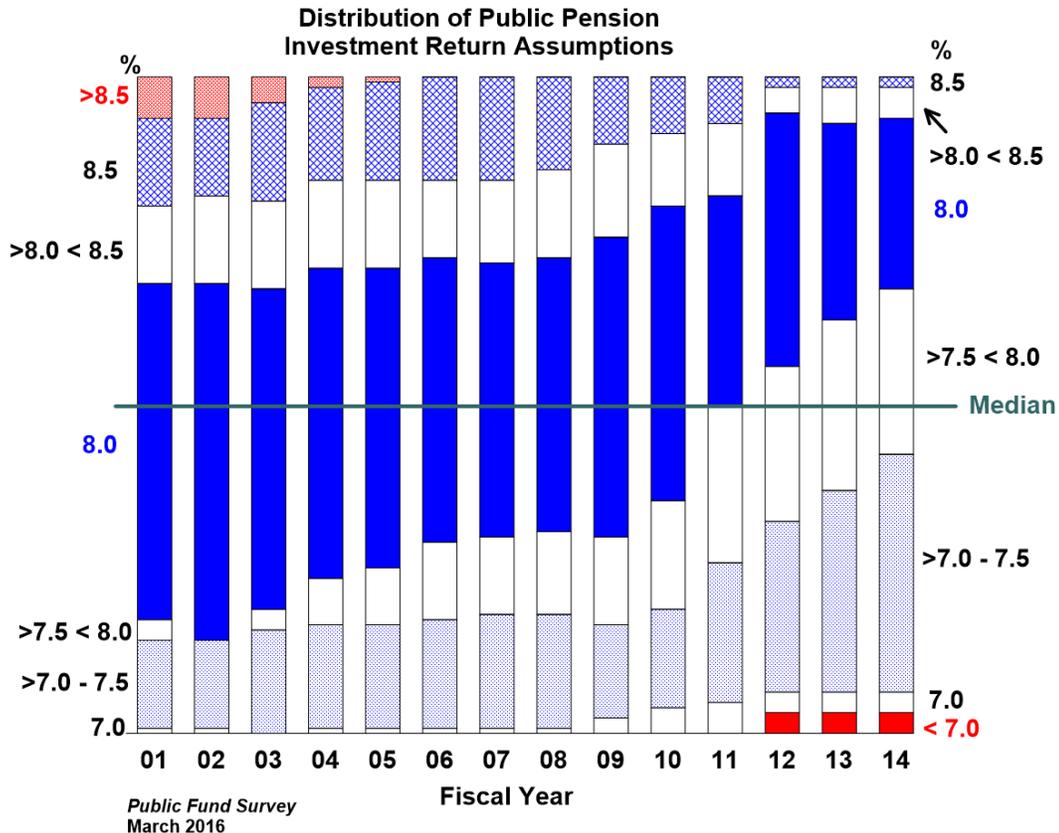
**DISCOUNT RATE**

The discount rate assumption is generally the most significant of all the assumptions employed in actuarial valuations. The discount rate is based on the long-term expected return on plan investments. In the short-term, a higher discount rate results in lower expected contributions. However, over the long term, actual contributions will depend on actual investment returns and not the discount rate (or expected investment returns). If actual investment returns are lower than expected, contribution rates will increase in the future. It is important to set a realistic discount rate so that projections of future contributions for budgeting purposes will not be biased, particularly to be too low.

**Other Large Public Retirement Plans**

Based on the Public Fund Survey, developed by the National Association of State Retirement Administrators (NASRA) covering most of the largest public retirement systems in the country, there has been a general movement over at least the last decade to reduce the discount rate used in actuarial valuations. Chart II-4 below shows the change in the distribution of assumptions since 2001. The median assumption is now 7.75% and the number of plans using a discount rate of 7.5% or lower has increased significantly.

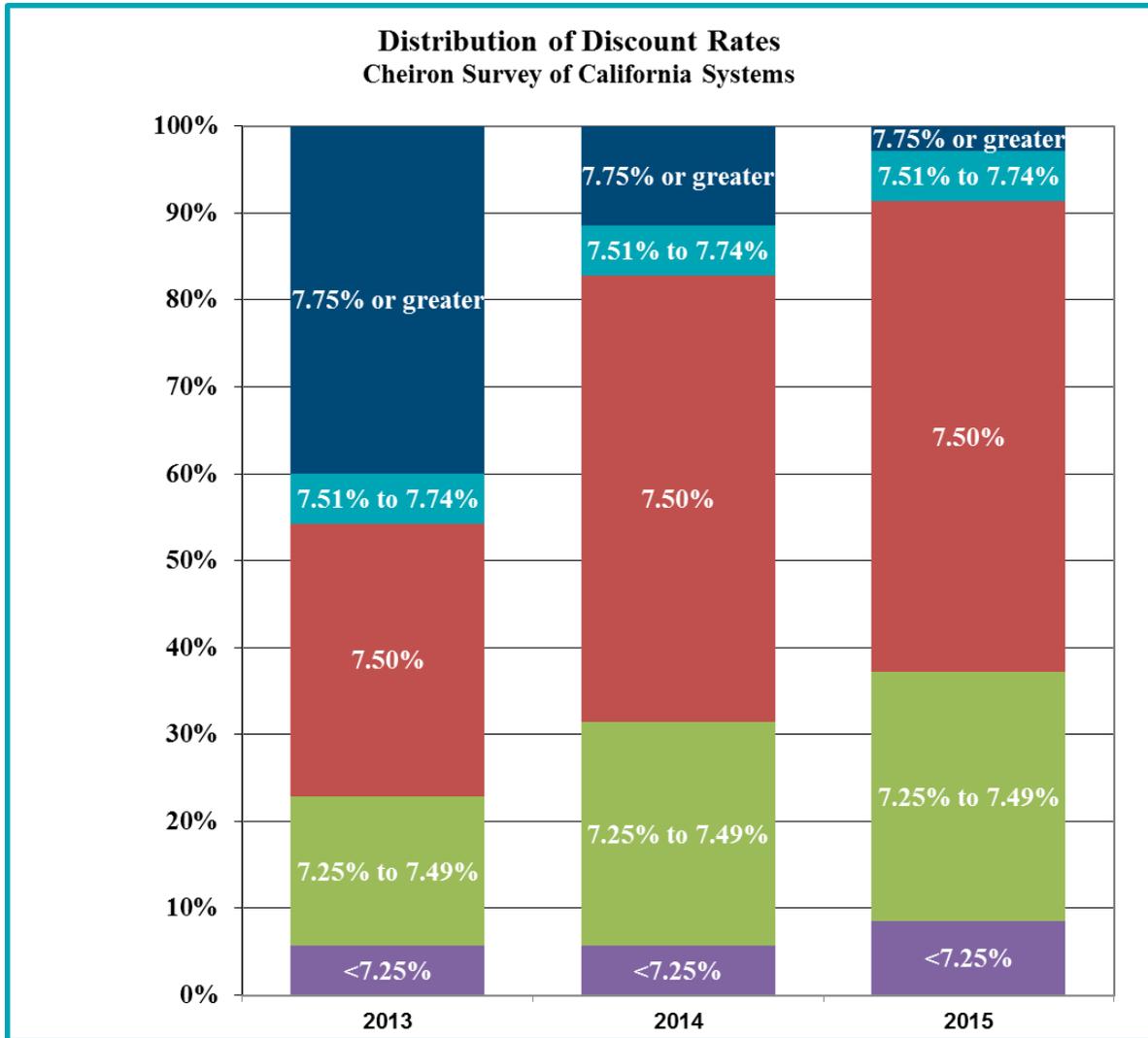
**Chart II-4**



**SECTION II – ECONOMIC ASSUMPTIONS  
DISCOUNT RATE**

In our survey of California retirement systems, the median assumption is even lower at 7.50% with 19 of the 35 systems using the median rate as of 2015. Only one system used a rate as high as 7.75%. Chart II-5 below shows the change in discount rate assumptions for California systems from 2013 to 2015.

**Chart II-5**



**Target Asset Allocation and Future Expectations**

The discount rate assumption depends on the anticipated average level of inflation and the anticipated average *real rate of return*. The real rate of return is the investment return in excess of underlying inflation. The expected average real rate of return is heavily dependent on asset mix: the portion of assets in stocks, bonds, and other asset classes.

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**SECTION II – ECONOMIC ASSUMPTIONS  
DISCOUNT RATE**

Tables II-2 and II-3 on the next page show the target allocation based on the Board's current policy along with the capital market assumptions provided by the Plan's investment consultant (PCA), and those from another investment consultant active in the 1937 Act systems (Verus). We elected to use Verus' assumptions to illustrate an alternative outlook, because they had similar benchmarks for most asset classes to those used by PCA. The PCA and Verus assumptions are both intended to project returns over a 10-year period.

Based on these assumptions, we calculated an expected geometric return of 7.50% under the PCA assumptions, but only a 6.85% return under the Verus assumptions.

**Table II-2**

<b>PCA (10-year) Assumptions</b>				
<b>Asset Category</b>	<b>Target Allocation</b>	<b>Arithmetic Return</b>	<b>Geometric Return</b>	<b>Standard Deviation</b>
Global Equity	30.0%	9.1%	7.5%	19.0%
Stable Fixed	10.0%	3.0%	2.9%	4.0%
Credit	14.0%	8.0%	7.5%	10.0%
Risk Parity	14.0%	6.0%	5.0%	14.4%
Private Appreciation	12.0%	12.1%	9.2%	26.0%
Crisis Risk Offset	20.0%	7.8%	7.1%	11.9%
<b>Total</b>	<b>100.0%</b>	<b>7.99%</b>	<b>7.50%</b>	<b>10.32%</b>
<b>Real Return</b>		<b>5.74%</b>	<b>5.25%</b>	

**Table II-3**

<b>Verus (10-year) Assumptions*</b>				
<b>Asset Category</b>	<b>Target Allocation</b>	<b>Arithmetic Return</b>	<b>Geometric Return</b>	<b>Standard Deviation</b>
Global Equity	30.0%	9.1%	7.8%	16.9%
Stable Fixed	10.0%	3.3%	3.3%	3.2%
Credit (HY)	7.0%	7.6%	7.1%	10.6%
Credit (Lev Loan))	7.0%	4.5%	4.2%	8.1%
Risk Parity	14.0%	7.5%	7.0%	10.0%
Private Equity	12.0%	11.0%	8.6%	23.7%
Crisis Risk Offset (Treas)	6.7%	2.5%	2.3%	6.5%
Crisis Risk Offset (HF)	13.3%	6.40%	6.02%	9.00%
<b>Total</b>	<b>100.0%</b>	<b>7.30%</b>	<b>6.85%</b>	<b>9.83%</b>
<b>Real Return</b>		<b>5.32%</b>	<b>4.87%</b>	

\* The Verus assumptions did not include Credit, Private Appreciation or Crisis Risk Offset classes, therefore we used a blending of Verus asset classes with similar benchmarks for these classes.

**SECTION II – ECONOMIC ASSUMPTIONS  
DISCOUNT RATE**

Based on these capital market assumptions, we also calculated the potential distribution of returns over 10-year periods as shown in Table II-4. The 50th percentile return under the PCA survey assumptions was 7.50%, which is slightly higher than the 7.40% nominal return recently adopted by the Board. Using PCA's average inflation assumption (2.25%), this results in a 5.25% real return assumption.

**Table II-4**

<b>Expected Distribution of Average Annual Passive Investment Returns</b>				
<b>Percentile</b>	<b>Verus (10 years)</b>		<b>Horizon Survey (20 years)</b>	
	<b>Nominal</b>	<b>Real</b>	<b>Nominal</b>	<b>Real</b>
<b>95th</b>	11.44%	9.34%	11.54%	9.25%
<b>75th</b>	8.27%	6.17%	9.03%	6.74%
<b>50th</b>	6.13%	4.03%	7.32%	5.03%
<b>25th</b>	4.02%	1.92%	5.64%	3.35%
<b>5th</b>	1.07%	-1.03%	3.26%	0.97%

As stated earlier in this report, the Verus geometric assumption for the current target portfolio is considerably lower over the next 10 years (6.85%). However, the median real return under the Verus assumptions (4.87%) is still higher than that recently adopted by the Board: 4.50%, based on a 7.40% nominal return and 2.90% price inflation.

As of the 2013 valuation, the expected rate of return is expressed net of investment, but not administrative expenses. The returns above were modeled based on the expected returns of the portfolio benchmark indices, which are expected to have minimal expenses. The actuarial standards on selecting a return assumption (ASOP 27) state that in general superior or inferior returns (net of fees) should not be assumed for active versus passive management, therefore we do not recommend a significant adjustment to the modeled returns for the fees of the asset managers. However, a slight margin is appropriate to reflect the investment-related expenses other than those of the investment managers, which would include the investment advisor and custodian.

The recently adopted discount rate of 7.40% is consistent with the PCA long-term capital market assumptions, including a small adjustment for investment-related expenses as described above. We therefore find the current discount rate to be a reasonable assumption. However, there are a number of factors that suggest that the near-term expected rate of return should be discussed.

- Many investment consultants expect poor rates of return in the immediate and near-term future. They reason that there is little in the way of yields on fixed income, and that the equity markets are fully valued.

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**SECTION II – ECONOMIC ASSUMPTIONS  
DISCOUNT RATE**

- If Verus and much of the investment community are correct in their projections, we can expect returns below the 7.40% assumed rate for a number of years. This will result in actuarial losses and increases in employer contribution rates. However, these losses may be partially offset by gains on the liabilities from price and wage inflation below the assumed level (2.90% and 3.15%, respectively)
- We believe that near- and mid-term return projections should be considered along with long-term projections. Fund performance is usually measured over five to ten years; longer measurement periods are often considered less relevant because of the potential for changes in the economy and in the investment markets.

We recommend that the Board and staff continue to conduct at least a brief discussion of this assumption annually, in consultation with the Plan's actuary and investment consultant, to determine if further changes are appropriate.

### SECTION III – DEMOGRAPHIC ASSUMPTIONS MERIT SALARY INCREASES

Demographic assumptions are used to predict membership behavior, including rates of retirement, termination, disability, and mortality. These assumptions are based primarily on the historical experience of SJCERA, with some adjustments where future experience is expected to differ from historical experience and with deference to standard tables where SJCERA experience is not fully credible and a standard table is available. For purposes of this study, merit salary increases are also considered a demographic assumption because the assumption is based primarily on SJCERA's historical experience.

#### MERIT SALARY INCREASES

Salary increases consist of three components: Increases due to cost of living maintenance (inflation), increases related to non-inflationary pressures on base pay (such as productivity increases), and increases in individual pay due to merit, promotion, and longevity. Increases due to cost of living and non-inflationary base pay factors were addressed in an earlier section of this report.

The merit salary increase assumption is analyzed by employee group and by service. Generally, newer employees are more likely to earn a longevity increase or receive a promotion, so their salary increases tend to be greater than those for longer service employees. Two different approaches were used to analyze the merit increases: a *longitudinal* study and a *transverse* study.

A *longitudinal* study reviews the average increase in pay for each level of service. To analyze the merit component, we subtracted the Plan's real wage growth - as measured by the base wage increases reflected in the most recent collective bargaining agreements covering most employees - from the total pay increases experienced by each member during the experience study period. Longitudinal studies, which use changes in pay collected over several years need to consider the effects of inflation, collective bargaining, and management decisions during the term of the study in order to be reliable.

Charts III-1 and III-3 on the following pages analyze the pay patterns for General and Safety members, respectively. The charts show the current assumption (red line) compared to the actual experience (blue line) and the proposed assumption (green line).

Charts III-2 and III-4 illustrate the results of the *transverse* study. It compares the current pay patterns for each group with current pay data. Only increases due to merit (longevity and promotion) are considered here. In the graphs, the average pay of the active General and Safety members of December 31, 2015 is plotted against service. A curve is then fitted to the average pay data, and this curve is used to determine a pay increase due to merit.

In each chart, the current assumed pay increases due to merit are shown by the teal line and the proposed pay increases due to merit are shown by the purple line. The blue diamonds represent the average pay at each year of service. The charts show proposed modifications to the merit salary increases for both General and Safety members.

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**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
MERIT SALARY INCREASES**

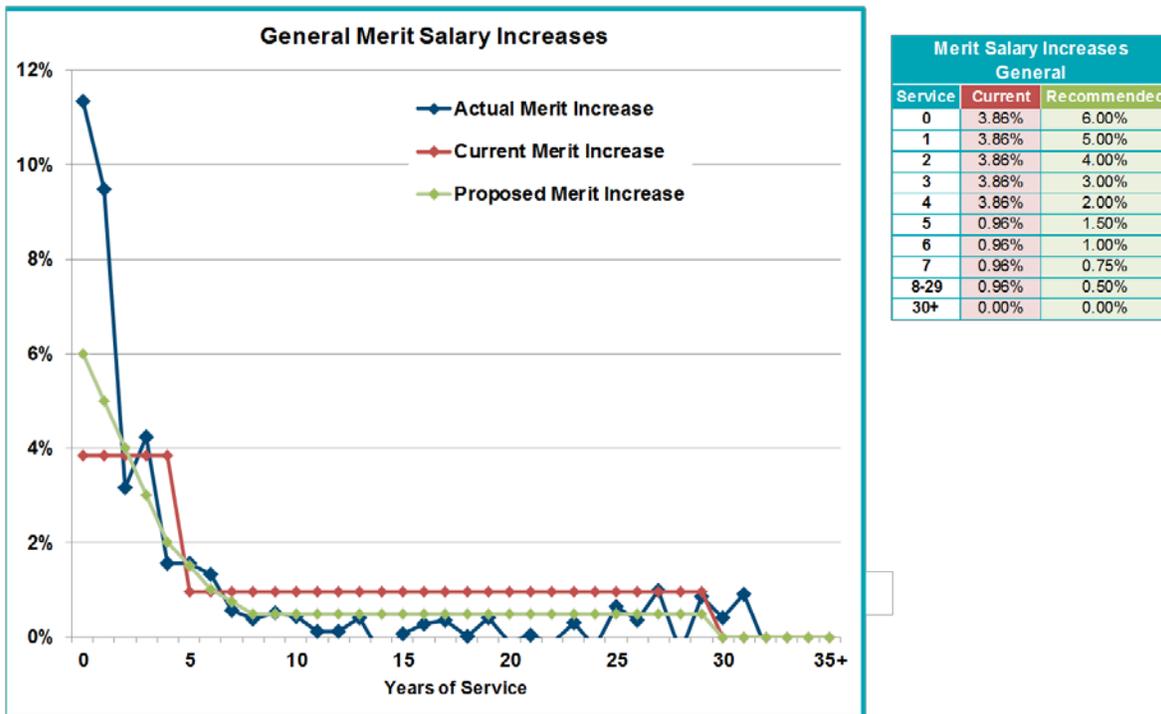
Salaries are examined at one point in time (the valuation date), as opposed to being observed over a number of years (a *longitudinal* study). This type of study serves as a reliable way to assess average increases in pay due to merit. With a homogeneous group of any size at all, the pattern of promotions and longevity increases during the career of an average employee is clearly visible in this analysis.

It is important to note that the data may have been skewed by negative increases in some years. Therefore, as with any assumption change, there is movement in the direction of data, but not necessarily the entire way.

For General members, the longitudinal analysis indicates a consistent pattern of higher increases with lower service levels and lower increases later in a member's career. General member increases have averaged about 0.20% after seven years of service for the last three years.

We have proposed new assumptions with higher increases in the first three years of service, and slightly lower increases after six years of service, when compared to the previous assumption. The proposal maintains an ultimate rate of 0.0% when the member has 30 years of service.

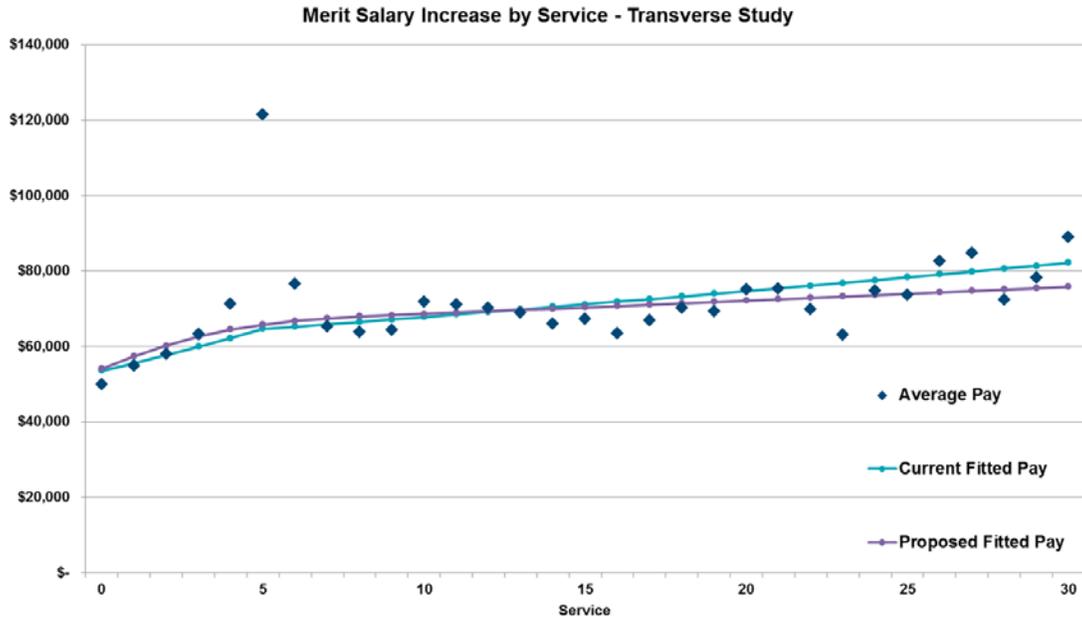
**Chart III-1: General**



SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015

SECTION III – DEMOGRAPHIC ASSUMPTIONS  
MERIT SALARY INCREASES

Chart III-2: General



Safety member merit increases for longer service members have been very low on average from 7-20 years of service (in some cases negative), but still exhibit some growth (avg. 1.5%) after 20 years of service.

Similar to the General members, we have proposed new assumptions with higher increases in the first three years of service, and slightly lower increases after five years of service, when compared to the previous assumption. The proposal decreases the ultimate salary increase from 1.93% per year once the member has five years of service to 1.25% once the member has six years of service.

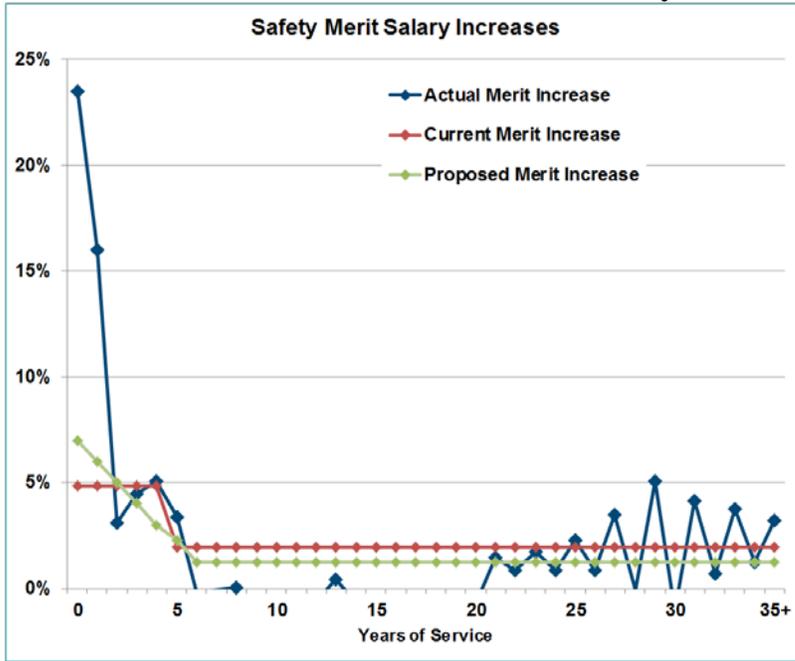
An argument could be made for even higher early career increases for both General and Safety, but data in the first year of service is subject to volatility due to the annualization of pay. We also reviewed early career actual pay patterns and they appear reasonable compared to assumptions.

The revised assumptions for both the General and Safety groups provide a better fit to the data under both longitudinal and transverse approaches.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
MERIT SALARY INCREASES**

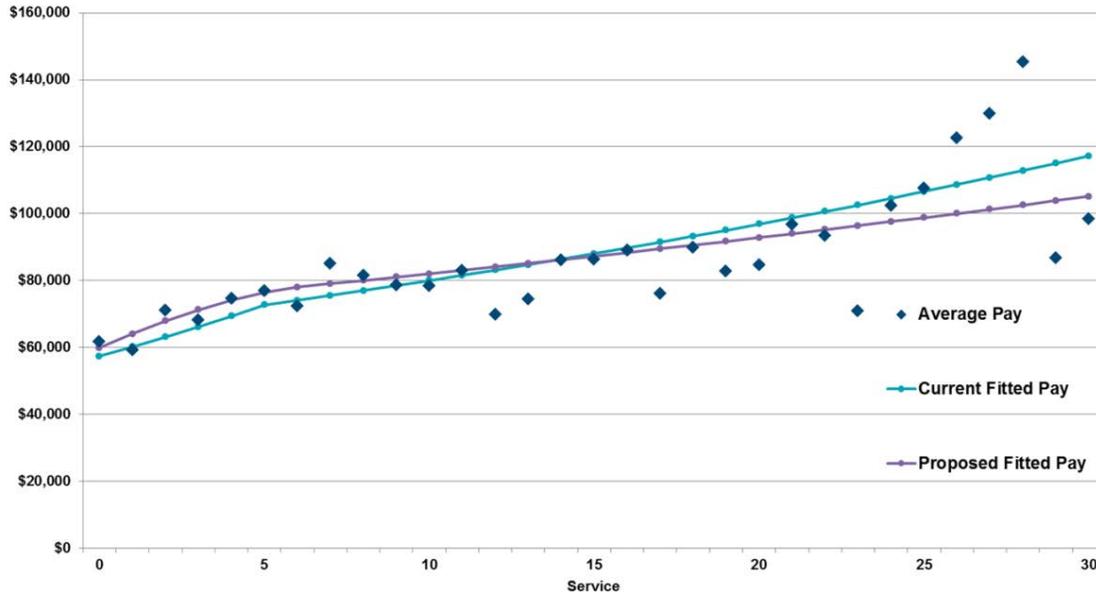
**Chart III-3: Safety**



Merit Salary Increases Safety		
Service	Current	Recommended
0	4.83%	7.00%
1	4.83%	6.00%
2	4.83%	5.00%
3	4.83%	4.00%
4	4.83%	3.00%
5	1.93%	2.25%
6	1.93%	1.25%
7	1.93%	1.25%
8	1.93%	1.25%
9	1.93%	1.25%
10	1.93%	1.25%
11	1.93%	1.25%
12	1.93%	1.25%
13	1.93%	1.25%
14	1.93%	1.25%
15	1.93%	1.25%
16	1.93%	1.25%
17	1.93%	1.25%
18	1.93%	1.25%
19	1.93%	1.25%
20	1.93%	1.25%
21	1.93%	1.25%
22	1.93%	1.25%
23	1.93%	1.25%
24	1.93%	1.25%
25+	1.93%	1.25%

**Chart III-4: Safety**

**Merit Salary Increase by Service - Transverse Study**



**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES**

## **ANALYSIS OF OTHER DEMOGRAPHIC ASSUMPTIONS**

For all of the remaining demographic assumptions, we determined the ratio of the actual number of decrements for each membership group compared to the expected number of decrements (A/E ratio or actual-to-expected ratio). If the assumption is perfect, this ratio will be 100%. Otherwise, any recommended assumption change should move from the current A/E ratio towards 100% unless future experience is expected to be different than the experience during the period of study.

We also calculate an r-squared statistic for each assumption. R-squared measures how well the assumption fits the actual data and can be thought of as the percentage of the variation in actual data explained by the assumption. Ideally, r-squared would equal 1.00 although this is never the case. Any recommended assumption change should increase the r-squared compared to the current assumption making it closer to 1.00 unless the pattern of future decrements is expected to be different from the pattern experienced during the period of study.

In addition, we calculated the 90% confidence interval, which represents the range within which the true decrement rate during the experience study period fell with 90% confidence. (If there is insufficient data to calculate a confidence interval, the confidence interval is shown as the entire range of the graph.) We generally propose assumption changes when the current assumption is outside the 90% confidence interval of the observed experience. However, adjustments are made to account for differences between future expectations and historical experience, to account for the past experience represented by the current assumption, and to maintain a neutral to slight conservative bias in the selection of the assumption. For mortality rates, we compare SJCERA's experience to that of a standard table and adjust the tables to bring the proposed assumption closer to an A/E ratio of 100%.

## **RETIREMENT RATES**

The current retirement rates vary by age and service and are applied to all members who are eligible to retire. Generally, at any given age, members with more service are generally more likely to retire than members with fewer years of service. SJCERA is not large enough to justify assumptions for each age and service combination. We continue to recommend separate assumptions by age and gender for each of the following three service groups for General members:

- Members with 5-9 years of service,
- Member with 10-29 years of service,
- Members with 30 or more years of service.

We recommend separate assumptions by age for each of the following two service groups for Safety members:

- Members with less than 20 years of service,
- Members with 20 or more years of service.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES**

We continue to recommend using the same assumptions for Tier I and II members, with the exception that the rates will only be applied once the member is eligible for retirement. For example, the retirement rates for the Tier II General members will not be applied until the member has reached age 52.

Although some have speculated that the reduced multipliers reflected in the Tier II benefits may result in members working longer than they would have under the Tier I benefit formulas, we do not yet have any plan experience to support a different set of assumptions. In addition, our initial modeling of the Tier II benefits revealed that the actuarially determined contribution rates required to fund these benefits are relatively insensitive to the actual retirement rates, as a result of the early retirement reductions reflected in the benefit formulas.

Table III-R1 shows the calculation of actual-to-expected ratios and the r-squared statistic for General female members with between 5-9 years of service. Charts III-R1 shows the information graphically along with the 90% confidence interval.

The data shows lower actual retirement rates than expected under the current assumption. The proposed assumption decreases the aggregate assumed rate of retirement and increases the aggregate A/E ratio from 83% to 99%. The r-squared also increases from 0.12 to 0.18.

See Appendices A and B for a full listing of the proposed and prior rates. The ultimate retirement age remains at 70.

**Table III-R1 – General**

Female Retirement Rates - 5-9 Years of Service						
Age	Exposures	Retirements			Actual to Expected Ratios	
		Actual	Current	Recommended	Current	Recommended
50 - 54	263	9	13	9	68%	98%
55 - 59	181	7	9	6	77%	110%
60 - 64	135	9	10	10	89%	89%
65+	51	8	8	8	105%	105%
<b>Total</b>	<b>630</b>	<b>33</b>	<b>40</b>	<b>33</b>	<b>83%</b>	<b>99%</b>
<b>R-squared</b>			<b>0.1228</b>	<b>0.1779</b>		

SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015

SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES

Chart III-R1 -General



**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES**

Table III-R2 shows the calculation of actual-to-expected ratios and the r-squared statistic for General female members with service between 10 and 29 years, and Chart III-R2 shows the information graphically along with the 90% confidence interval.

The data shows lower actual retirement rates than expected under the current assumption. The proposed assumption decreases the overall assumed rate of retirement and increases the aggregate A/E ratio from 86% to 99%. The r-squared also increases from 0.79 to 0.94.

See Appendices A and B for a full listing of the proposed and prior rates. The ultimate retirement age remains at 70.

**Table III-R2 – General**

<b>Female Retirement Rates - 10-29 Years of Service</b>						
<b>Age</b>	<b>Exposures</b>	<b>Retirements</b>			<b>Actual to Expected Ratios</b>	
		<b>Actual</b>	<b>Current</b>	<b>Recommended</b>	<b>Current</b>	<b>Recommended</b>
50	187	4	9	7	43%	61%
51	209	7	10	7	67%	96%
52	226	9	11	8	80%	114%
53	214	8	11	7	75%	107%
54	186	8	9	7	86%	123%
55	177	9	9	6	102%	145%
56	199	16	14	14	115%	115%
57	205	14	14	14	98%	98%
58	209	14	21	15	67%	96%
59	197	14	20	14	71%	102%
60	179	24	18	22	134%	107%
61	139	16	21	17	77%	92%
62	110	26	28	28	95%	95%
63	85	21	21	21	99%	99%
64	72	15	18	18	83%	83%
65+	184	43	53	46	82%	93%
<b>Total</b>	<b>2,778</b>	<b>248</b>	<b>287</b>	<b>251</b>	<b>86%</b>	<b>99%</b>
<b>R-squared</b>			<b>0.7917</b>	<b>0.9447</b>		

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES**

**Chart III-R2 - General**

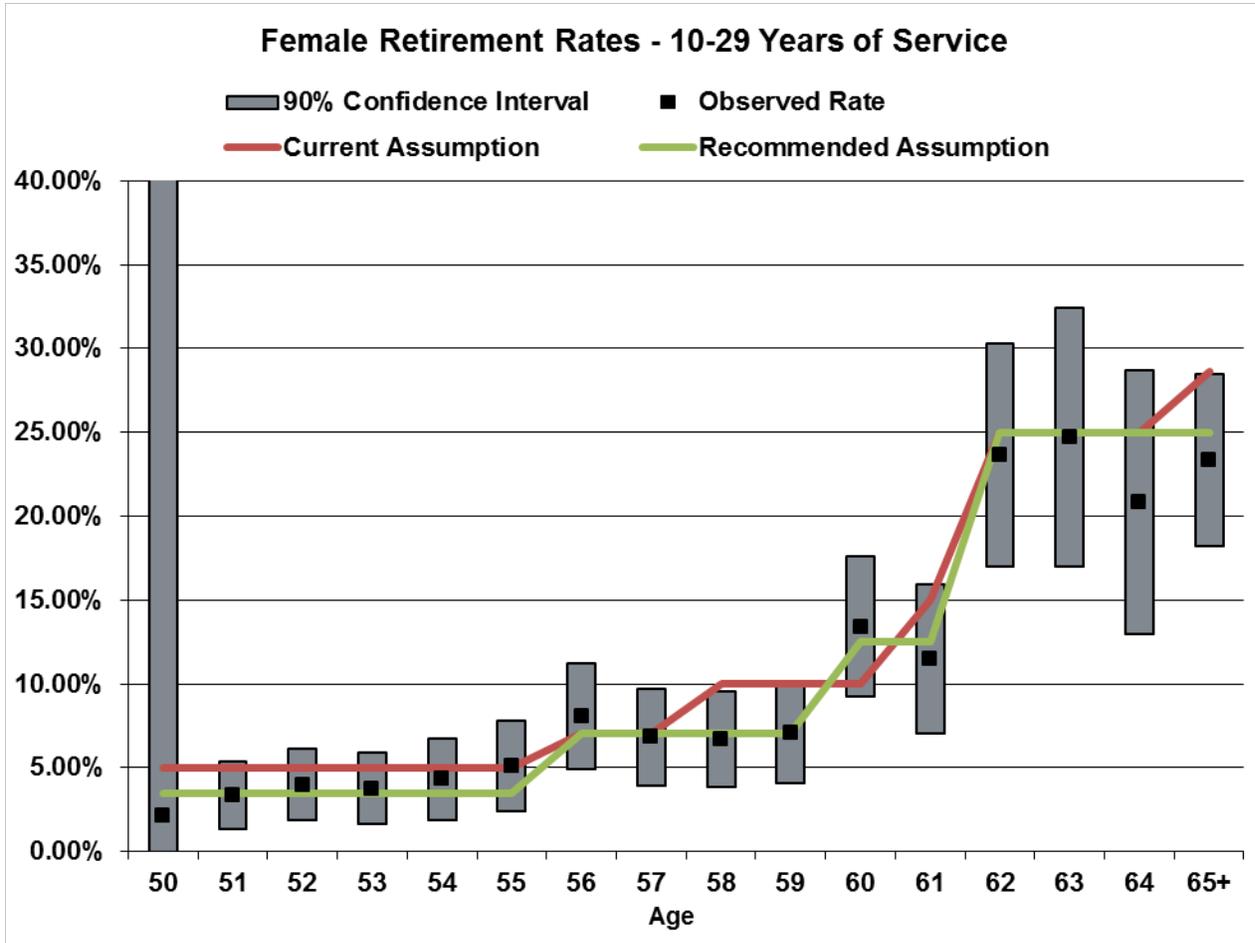


Table III-R3 shows the calculation of actual-to-expected ratios and the r-squared statistic for General female members with 30 or more years of service. Chart III-R3 shows the information graphically along with the 90% confidence interval.

The data shows lower actual retirement rates than expected under the current assumption. The proposed assumption decreases the aggregate assumed rate of retirement and increases the aggregate A/E ratio from 69% to 90%. The r-squared also increases from 0.84 to 0.88.

See Appendices A and B for a full listing of the proposed and prior rates. The ultimate retirement age remains at 70.

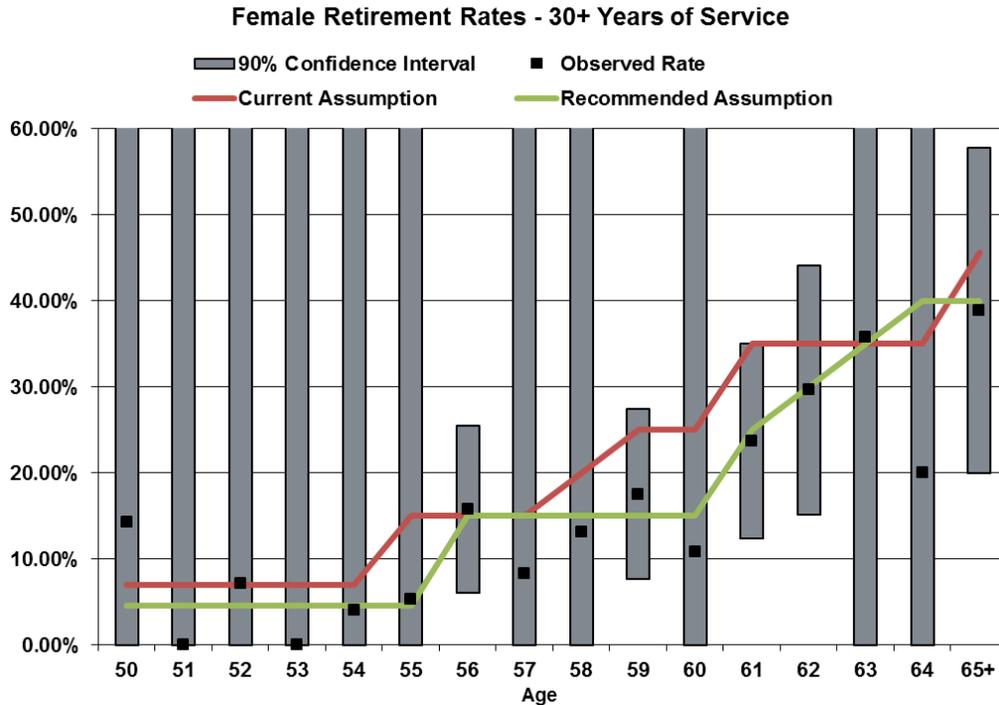
**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES**

**Table III-R3 – General**

Female Retirement Rates - 30+ Years of Service						
Age	Exposures	Retirements			Actual to Expected Ratios	
		Actual	Current	Recommended	Current	Recommended
50	7	1	0	0	204%	317%
51	8	0	1	0	0%	0%
52	14	1	1	1	102%	159%
53	16	0	1	1	0%	0%
54	25	1	2	1	57%	89%
55	38	2	6	2	35%	117%
56	38	6	6	6	105%	105%
57	48	4	7	7	56%	56%
58	38	5	8	6	66%	88%
59	40	7	10	6	70%	117%
60	37	4	9	6	43%	72%
61	38	9	13	10	68%	95%
62	27	8	9	8	85%	99%
63	14	5	5	5	102%	102%
64	10	2	4	4	57%	50%
65+	18	7	8	7	85%	97%
<b>Total</b>	<b>416</b>	<b>62</b>	<b>90</b>	<b>69</b>	<b>69%</b>	<b>90%</b>
<b>R-squared</b>			<b>0.8356</b>	<b>0.8770</b>		

**Chart III-R3 - General**



**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES**

Table III-R4 shows the calculation of actual-to-expected ratios and the r-squared statistic for General male members with between 5-9 years of service. Charts III-R4 shows the information graphically along with the 90% confidence interval.

The data shows lower actual retirement rates than expected under the current assumption. The proposed assumption decreases the aggregate assumed rate of retirement and increases the aggregate A/E ratio from 93% to 111%. The r-squared also increases from 0.03 to 0.17.

See Appendices A and B for a full listing of the proposed and prior rates. The ultimate retirement age remains at 70.

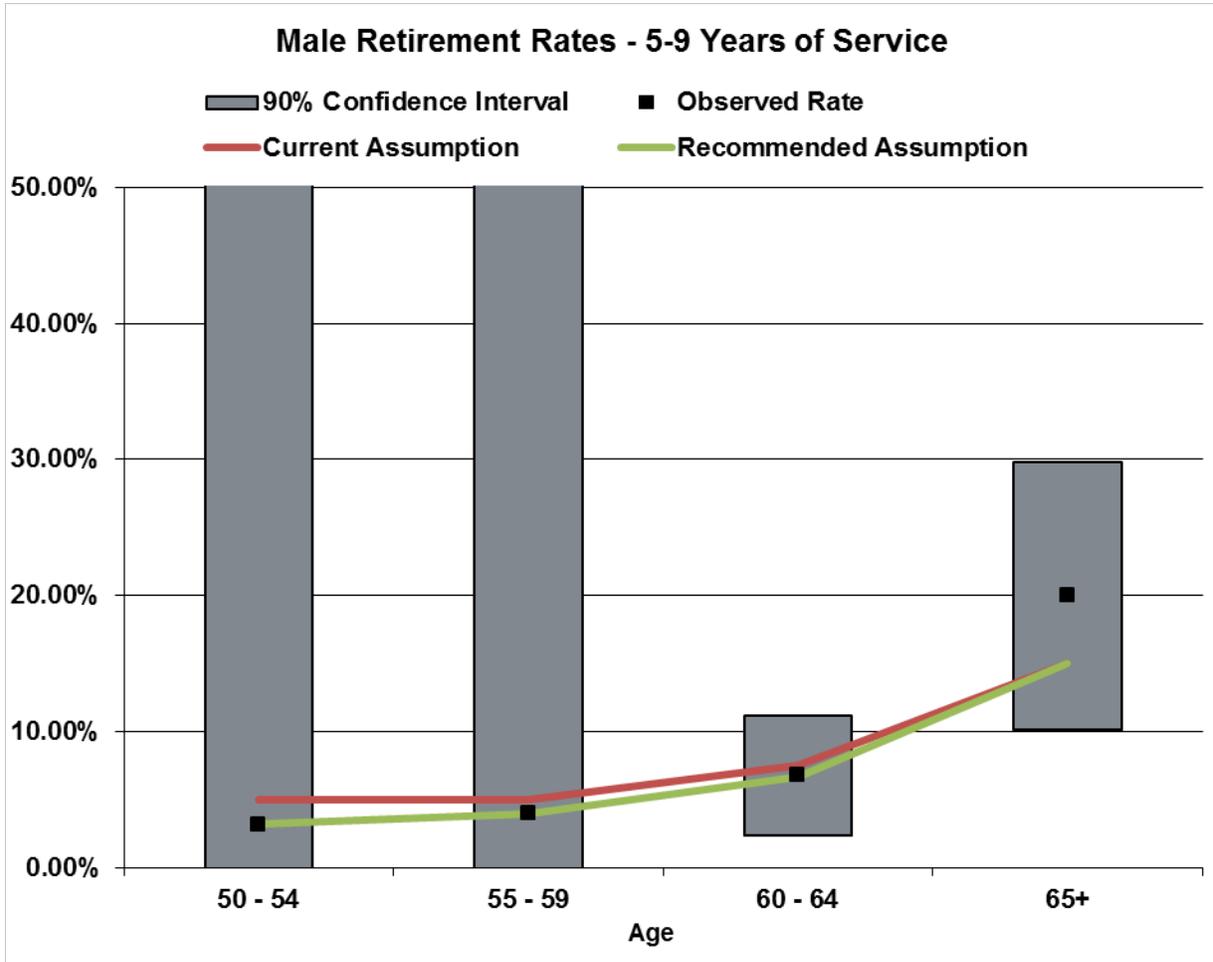
**Table III-R4 – General**

<b>Male Retirement Rates - 5-9 Years of Service</b>						
<b>Age</b>	<b>Exposures</b>	<b>Retirements</b>			<b>Actual to Expected Ratios</b>	
		<b>Actual</b>	<b>Current</b>	<b>Recommended</b>	<b>Current</b>	<b>Recommended</b>
50 - 54	126	4	6	4	63%	98%
55 - 59	123	5	6	5	81%	102%
60 - 64	88	6	7	6	91%	102%
65+	45	9	7	7	133%	133%
<b>Total</b>	<b>382</b>	<b>24</b>	<b>26</b>	<b>22</b>	<b>93%</b>	<b>111%</b>
<b>R-squared</b>			<b>0.0297</b>	<b>0.1734</b>		

SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
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SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES

Chart III-R4 - General



**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES**

Table III-R5 shows the calculation of actual-to-expected ratios and the r-squared statistic for General male members with service between 10 and 29 years, and Chart III-R5 shows the information graphically along with the 90% confidence interval.

The data shows slightly lower actual retirement rates than expected under the current assumption. The proposed assumptions have minimal impact on the overall assumed rate of retirement and the aggregate A/E ratio stays at 92%. The r-squared increases from 0.59 to 0.80.

See Appendices A and B for a full listing of the proposed and prior rates. The ultimate retirement age remains at 70.

**Table III-R5 – General**

<b>Male Retirement Rates - 10-29 Years of Service</b>						
<b>Age</b>	<b>Exposures</b>	<b>Retirements</b>			<b>Actual to Expected Ratios</b>	
		<b>Actual</b>	<b>Current</b>	<b>Recommended</b>	<b>Current</b>	<b>Recommended</b>
50 - 52	267	11	13	11	82%	103%
53 - 55	265	13	13	14	98%	91%
56 - 58	251	9	15	10	62%	90%
59 - 61	222	28	31	35	91%	80%
62 - 64	126	33	32	34	105%	97%
65+	116	33	35	35	95%	95%
<b>Total</b>	<b>1,247</b>	<b>127</b>	<b>138</b>	<b>139</b>	<b>92%</b>	<b>92%</b>
<b>R-squared</b>			<b>0.5949</b>	<b>0.8046</b>		

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES**

**Chart III-R5 - General**

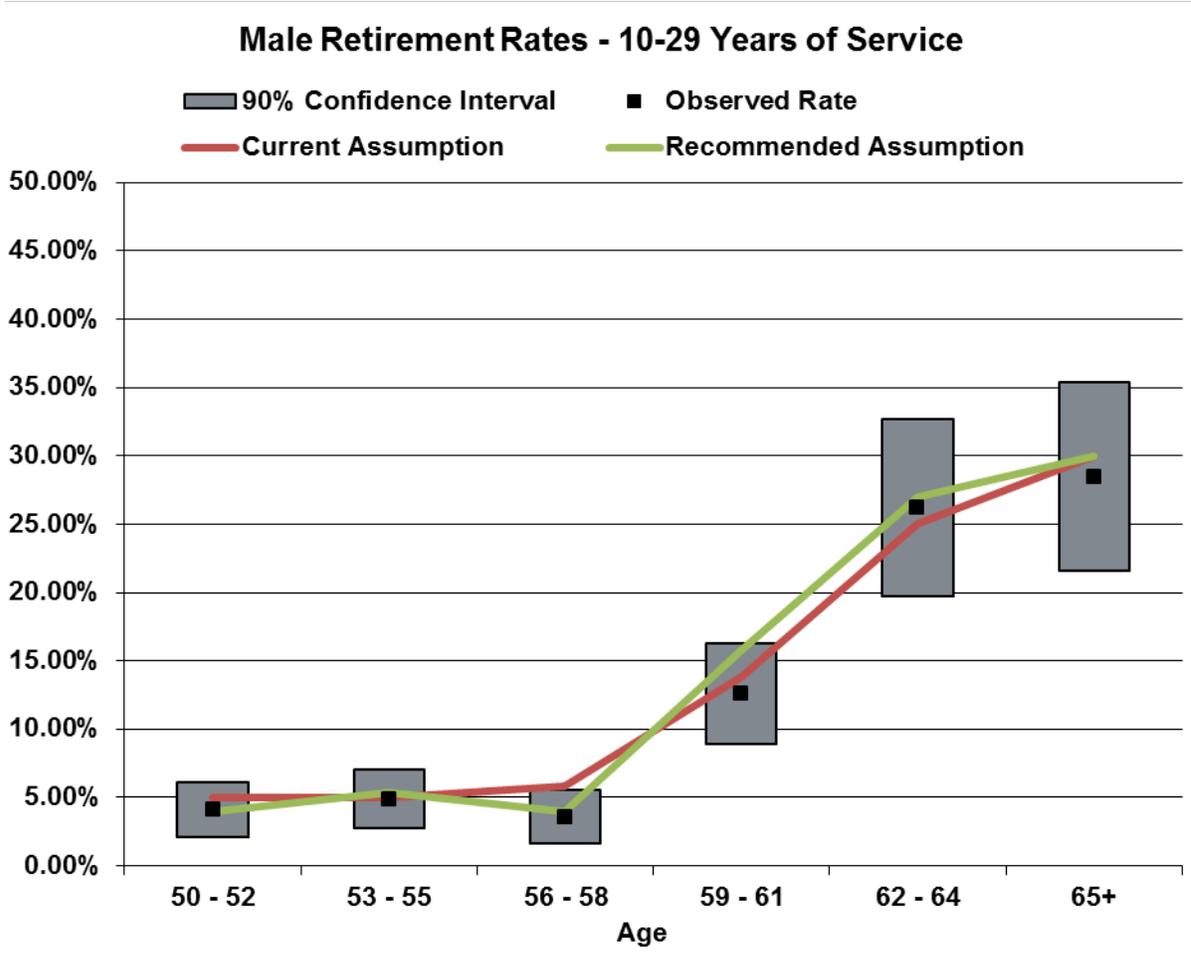


Table III-R6 shows the calculation of actual-to-expected ratios and the r-squared statistic for General male members with 30 or more years of service. Chart III-R6 shows the information graphically along with the 90% confidence interval.

The data shows actual retirement rates are as expected under the current assumption. We recommend no changes to the assumption since the aggregate A/E ratio is 100%. The r-squared is 0.74.

See Appendices A and B for a full listing of the proposed and prior rates. The ultimate retirement age remains at 70.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES**

**Table III-R6 - General**

<b>Male Retirement Rates - 30+ Years of Service</b>						
<b>Age</b>	<b>Exposures</b>	<b>Retirements</b>			<b>Actual to Expected Ratios</b>	
		<b>Actual</b>	<b>Current</b>	<b>Recommended</b>	<b>Current</b>	<b>Recommended</b>
50 - 52	3	0	0	0	0%	0%
53 - 55	22	2	2	2	95%	95%
56 - 58	46	7	8	8	89%	89%
59 - 61	71	16	20	20	78%	78%
62 - 64	31	19	12	12	162%	162%
65+	11	3	5	5	61%	61%
<b>Total</b>	<b>184</b>	<b>47</b>	<b>47</b>	<b>47</b>	<b>100%</b>	<b>100%</b>
<b>R-squared</b>			<b>0.7353</b>	<b>0.7353</b>		

**Chart III-R6 - General**



**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES**

Retirement data for Safety members between January 1, 2013 and December 2015 was somewhat limited, with less than 65 retirements and about 500 exposures. We have added data from the prior study to add more credibility to these calculations.

Table III-R7 shows the calculation of actual-to-expected ratios and the r-squared statistic for all Safety members, and Chart III-R7 shows the information graphically along with the 90% confidence interval.

The data shows actual retirement rates are as expected under the current assumption. We recommend no change to the Safety members retirement rates at his time. The aggregate A/E ratio is 100% and the r-squared is 0.90.

We note that the current Safety retirement assumptions are split between those with less than twenty years of service and those with at least twenty years of service, with those having greater service levels assumed to experience higher retirement rates at the same age. The same pattern continues to hold in the recent retirement data; therefore we have not recommended any changes to this approach or to the suggested rates at each age or service level.

See Appendices A and B for a full listing of the proposed and prior rates. The ultimate retirement age remains at 65.

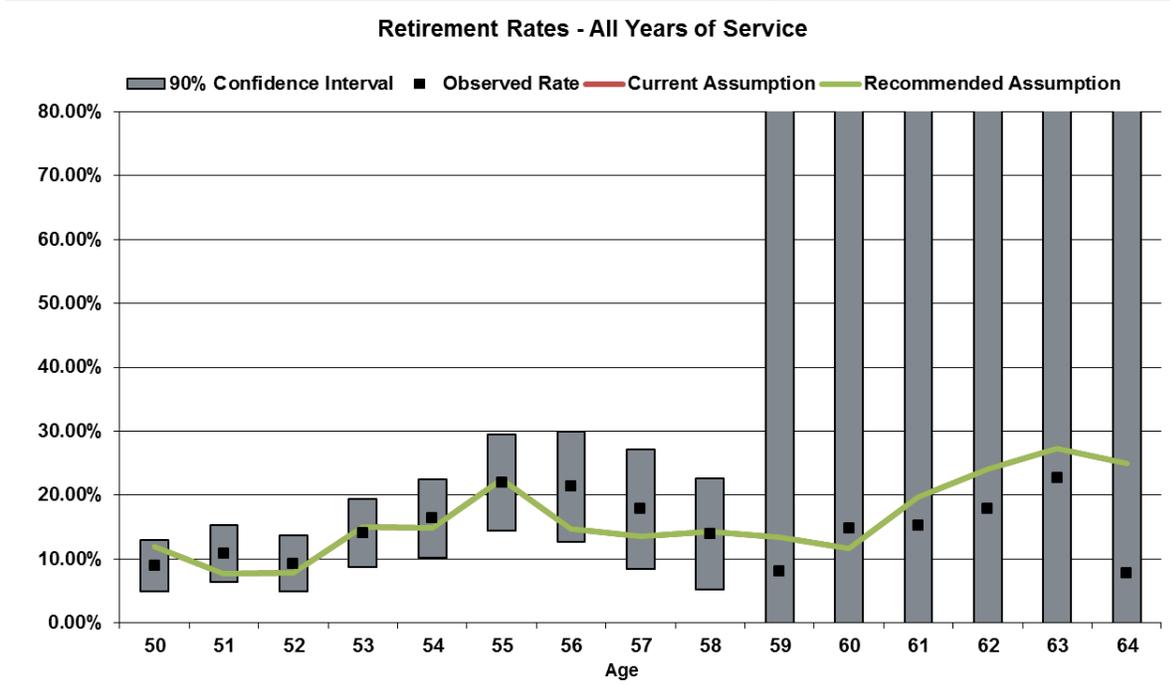
**Table III-R7 - Safety**

Retirement Rates - All Years of Service						
Age	Exposures	Retirements			Actual to Expected Ratios	
		Actual	Current	Recommended	Current	Recommended
50	134	12	16	16	75%	75%
51	129	14	10	10	141%	141%
52	119	11	9	9	118%	118%
53	114	16	17	17	94%	94%
54	98	16	15	15	110%	110%
55	82	18	18	18	98%	98%
56	61	13	9	9	144%	144%
57	45	8	6	6	131%	131%
58	43	6	6	6	98%	98%
59	37	3	5	5	61%	61%
60	34	5	4	4	127%	127%
61	33	5	7	7	77%	77%
62	28	5	7	7	74%	74%
63	22	5	6	6	83%	83%
64	13	1	3	3	31%	31%
<b>Total</b>	<b>992</b>	<b>138</b>	<b>138</b>	<b>138</b>	<b>100%</b>	<b>100%</b>
<b>R-squared</b>			<b>0.9030</b>	<b>0.9030</b>		

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
RETIREMENT RATES**

**Chart III-R7 - Safety**



**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III — DEMOGRAPHIC ASSUMPTIONS  
TERMINATION RATES**

Termination rates reflect the frequency at which active members leave employment for reasons other than retirement, death, or disability. Currently, the termination rates are based on service for both Safety and General members. We have found that the rate of termination is more related to years of service rather than age. This methodology also avoids under-weighting the liabilities that can occur is using age-based rates only. The termination rates do not apply once members are eligible for a service retirement benefit.

Table III-T1 shows the calculation of actual-to-expected ratios and the r-squared statistic for General members, and Chart III-T1 shows the information graphically along with the 90% confidence interval.

The data shows slightly higher actual termination rates than expected under the current assumption. We are recommending modest increases in the General termination rates for those members with less than 20 years of service. The proposed assumption increases the assumed rates of termination and decreases the aggregate A/E ratio from 120% to 99%. The r-squared also increases from 0.96 to 0.99. We note that because the number of terminations and exposures is quite high, a higher degree of credibility can be assigned to the termination experience, and therefore we are comfortable recommending assumptions that align closely with the data.

See Appendices A and B for a full listing of the proposed and prior rates.

**Table III-T1**

<b>Termination Rates - General: All Years of Service</b>						
<b>Service</b>	<b>Exposures</b>	<b>Retirements</b>			<b>Actual to Expected Ratios</b>	
		<b>Actual</b>	<b>Current</b>	<b>Recommended</b>	<b>Current</b>	<b>Recommended</b>
0	898	168	114.5	157.2	147%	107%
1	1,106	118	110.6	121.7	107%	97%
2	602	58	60.2	60.2	96%	96%
3	314	22	24.3	24.3	90%	90%
4	320	19	15.2	21.6	125%	88%
5	421	34	18.9	26.3	179%	129%
6	552	32	24.8	33.1	129%	97%
7	581	22	26.1	26.1	84%	84%
8	450	25	16.9	20.3	148%	123%
9	345	11	10.4	12.9	106%	85%
10	314	11	6.3	11.8	175%	93%
11	392	9	7.8	10.8	115%	83%
12	406	10	8.1	11.2	123%	90%
13	377	9	7.5	9.4	119%	95%
14	279	6	5.6	7.0	108%	86%
15 - 19	680	13	13.6	17.0	96%	76%
20 - 24	278	3	2.8	2.8	108%	108%
25 - 29	84	0	0.8	0.8	0%	0%
<b>Total</b>	<b>8,399</b>	<b>570</b>	<b>474.6</b>	<b>574.5</b>	<b>120%</b>	<b>99%</b>
<b>R-squared</b>			<b>0.9584</b>	<b>0.9941</b>		

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III — DEMOGRAPHIC ASSUMPTIONS  
TERMINATION RATES**

**Chart III-T1**

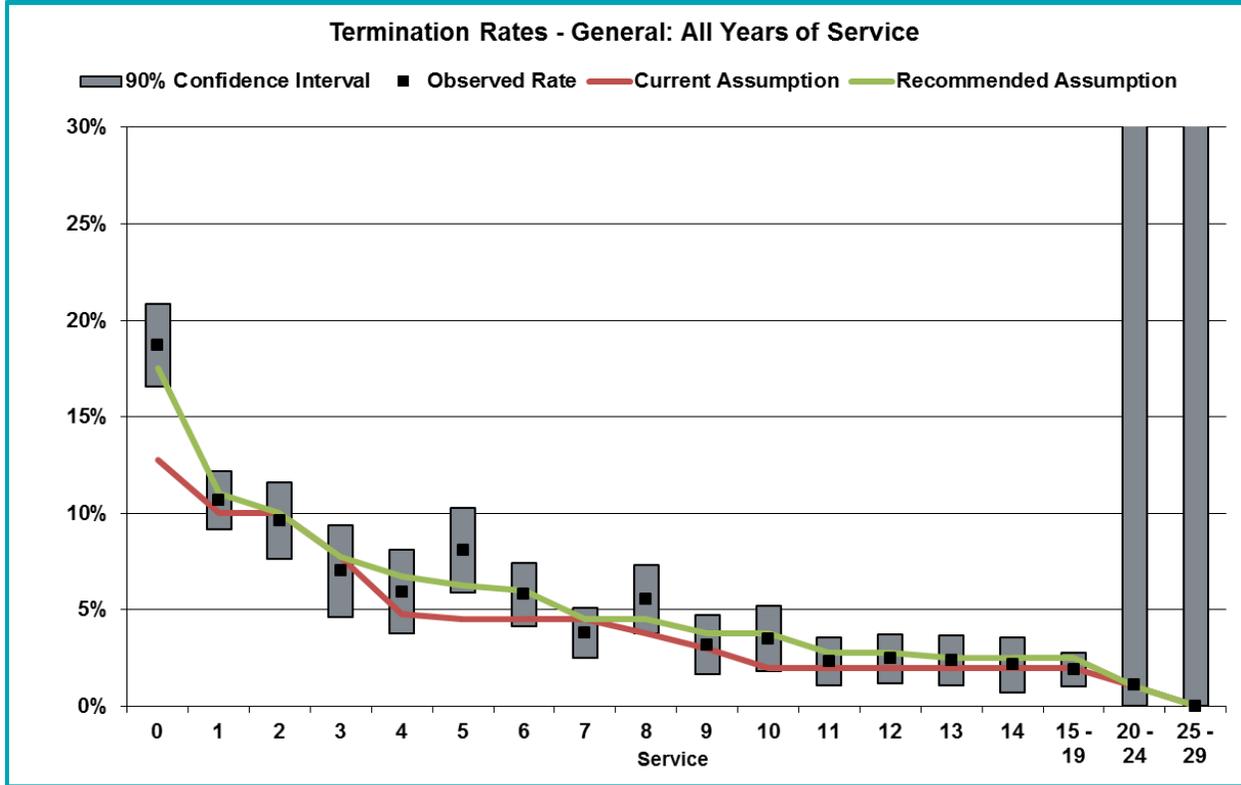


Table III-T2 shows the calculation of actual-to-expected ratios and the r-squared statistic for Safety members, and Chart III-T2 shows the information graphically along with the 90% confidence interval.

The data shows that actual termination rates are slightly higher when a member has only five years of service or less, but lower after they reach five years of service. In aggregate, the proposed assumptions decrease the assumed rates of termination. The proposal increases the aggregate A/E ratio from 93% to 98%. The r-squared increases from 0.71 to 0.82.

See Appendices A and B for a full listing of the proposed and prior rates.

SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015

**SECTION III — DEMOGRAPHIC ASSUMPTIONS**  
**TERMINATION RATES**

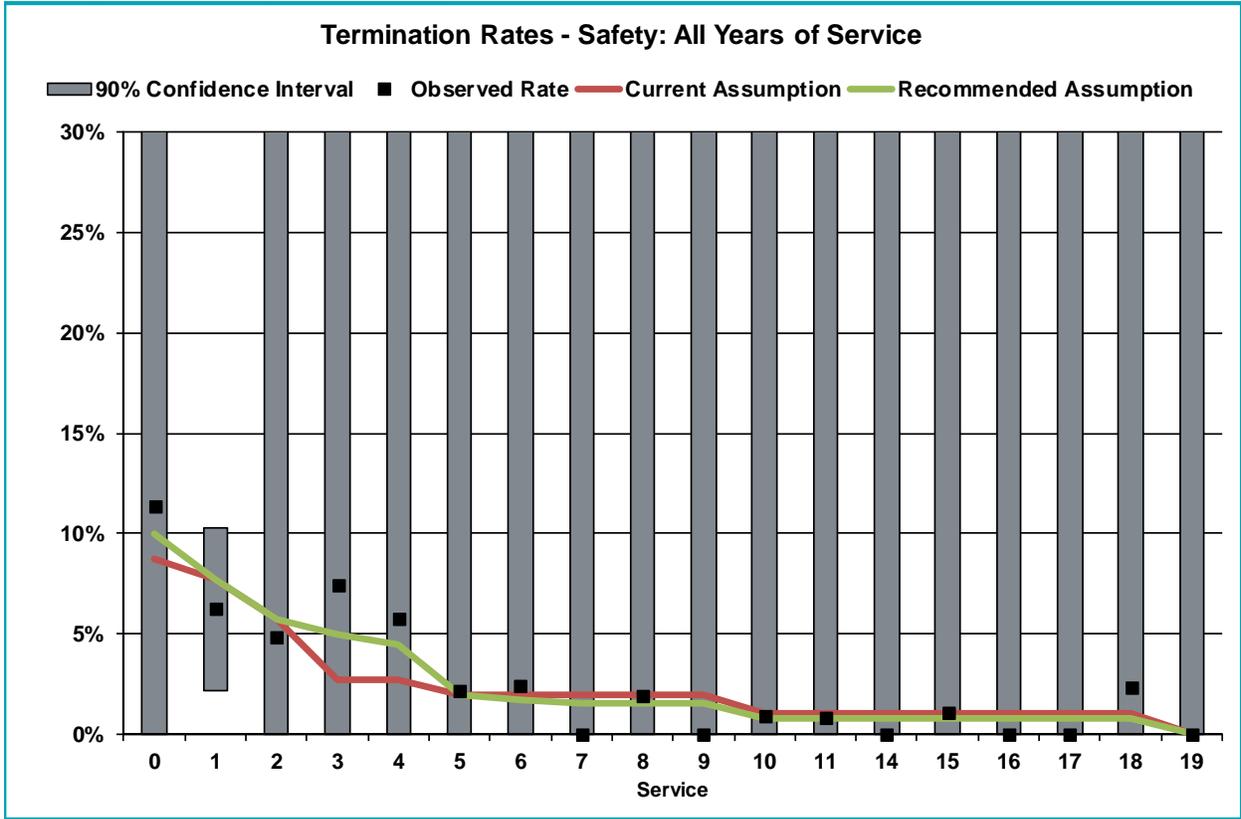
**Table III-T2**

Termination Rates - Safety: All Years of Service						
Service	Exposures	Retirements			Actual to Expected Ratios	
		Actual	Current	Recommended	Current	Recommended
0	44	5	3.9	4.4	130%	114%
1	96	6	7.4	7.4	81%	81%
2	41	2	2.4	2.4	85%	85%
3	27	2	0.7	1.4	269%	148%
4	69	4	1.9	3.1	211%	129%
5	138	3	2.8	2.8	109%	109%
6	166	4	3.3	2.9	120%	138%
7	149	0	3.0	2.2	0%	0%
8	103	2	2.1	1.5	97%	129%
9	95	0	1.9	1.4	0%	0%
10	107	1	1.1	0.8	93%	125%
11	116	1	1.2	0.9	86%	115%
14	96	0	1.0	0.7	0%	0%
15	93	1	0.9	0.7	108%	143%
16	70	0	0.7	0.5	0%	0%
17	55	0	0.6	0.4	0%	0%
18	43	1	0.4	0.3	233%	310%
19	0	0	0	0	0%	0%
<b>Total</b>	<b>1,508</b>	<b>32</b>	<b>35.1</b>	<b>33.9</b>	<b>91%</b>	<b>94%</b>
<b>R-squared</b>			<b>0.7113</b>	<b>0.8242</b>		

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III — DEMOGRAPHIC ASSUMPTIONS  
TERMINATION RATES**

**Chart III-T2**



**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III — DEMOGRAPHIC ASSUMPTIONS  
TERMINATION RATES**

**Refund Rates and Reciprocity**

When a vested member terminates employment, they have the option of receiving a refund of contributions with interest or a deferred annuity. If a member terminates employment and works for a reciprocal employer, the member's retirement benefit is ultimately based on the member's service with SJCERA and the highest Final Compensation based on employment with any reciprocal employer.

Table III-T3 shows the results of our analysis of refunds for General and Safety members, for the period from January 1, 2013 through December 31, 2015. We are recommending changes to the refund assumptions, but no change to the transfer assumptions (expressed as a percentage of non-refund terminations), at this time.

**Table III-T3**

	Total Service Terminations	Total Refunds	% of Total	Current Assumption	Proposed Assumption	Non-Refund Terminations	Reciprocal Transfers	% of Total	Current Assumption	Proposed Assumption
<b>General</b>										
<b>0 - 4</b>	382	233	61.0%	50.0%	60.0%					
<b>5 - 14</b>	215	58	27.0%	35.0%	30.0%					
<b>15+</b>	26	3	11.5%	0.0%	10.0%					
<b>Total</b>	623	294	47.2%			329	43	13.1%	25.0%	25.0%
<b>Safety</b>										
<b>0 - 4</b>	19	11	57.9%	20.0%	60.0%					
<b>5 - 14</b>	15	6	40.0%	10.0%	10.0%					
<b>15+</b>	3	0	0.0%	0.0%	0.0%					
<b>Total</b>	37	17	45.9%			20	7	35.0%	50.0%	50.0%

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III — DEMOGRAPHIC ASSUMPTIONS  
TERMINATION RATES**

Table III-T4 shows the results of our analysis of the age at which vested terminated and transferred members decide to retire. The current assumptions are that vested terminated General members will commence payment at age 58, and that vested terminated Safety members will commence payment at age 53. We are not recommending any changes to the General assumptions, but are recommending a change to the Safety assumptions from a commencement age of 53 to 50.

**Table III-T4**

<b>Average Retirement Age for Retirees from Vested Status</b>				
	<b>General</b>		<b>Safety</b>	
<b>Calendar Year</b>	<b># of New Retirees</b>	<b>Retirement Age</b>	<b># of New Retirees</b>	<b>Retirement Age</b>
2013	27	56.11	2	50.00
2014	20	61.37	0	0.00
2015	25	57.38	2	50.00
<b>Total</b>	<b>72</b>	<b>58.01</b>	<b>4</b>	<b>50.00</b>

As stated on the previous page, if a member terminates employment and works for a reciprocal employer, the member's retirement benefit is ultimately computed using the highest Final Compensation based on employment any reciprocal employer. We recommend that the assumption used to project pay during employment with the reciprocal employer be based on the wage growth assumption, compounded by the ultimate merit pay increase assumption described earlier in this report. Therefore, the recommended total pay growth assumptions for members in reciprocal status are 3.67% for General members and 4.44% for Safety members.

Also, reciprocal pay increases in the prior study were applied from the valuation date to the assumed retirement ages. Upon further review of the data, we recommend a change to projecting salary increases from the year of the members' most recent reported salary to their assumed retirement age.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
DISABILITY RATES**

This section analyzes the incidence of disability by the age of the employee. There are separate sets of assumptions for nonservice-connected disabilities and service-connected disabilities. Service-connected disability rates for Safety members are unisex, while all General rates and Safety nonservice-connected disability rates vary by gender. The disability decrement is only applied after members are eligible for disability benefits.

The amount of disability experience is fairly limited; only twenty disabilities have occurred during the last three years for Safety and General members combined. To improve the credibility of the data, we have aggregated the experience of the past three years with that of the prior experience study (2010-2012).

Table III-D1 shows the calculation of actual-to-expected ratios and the r-squared statistic for all disabilities for General members, and Chart III-D1 shows the information graphically. The 90% confidence interval is not shown because of a lack of credible data.

The data shows disability rates that are close to the current assumption. The current assumption has an A/E ratio of 77%. The r-squared is 0.40. The current assumption is somewhat conservative, but disability rates do not have significant impact on General cost. We are not proposing any change to the disability assumption for General members, including the incidence of duty-related vs. non-duty related disability, but if disability incidence remains low at the next experience study, reductions in disability rates may be considered.

See Appendix A or B for a full listing of the rates.

**Table III-D1**

<b>General Disability Incidence Rates</b>						
Age Band	Exposures	Disabilities			Actual to Expected Ratios	
		Actual	Current	Recommended	Current	Recommended
20 - 24	142	0	0	0	0%	0%
25 - 29	1,243	0	1	1	0%	0%
30 - 34	2,704	0	3	3	0%	0%
35 - 39	3,423	5	5	5	102%	102%
40 - 44	3,727	5	10	10	48%	48%
45 - 49	3,951	5	14	14	35%	35%
50 - 54	4,540	15	18	18	82%	82%
55 - 59	4,552	19	23	23	84%	84%
60 - 64	2,846	23	17	17	138%	138%
65 - 69	828	1	5	5	19%	19%
70 +	45	1	-	-	0%	0%
<b>Total</b>	<b>28,001</b>	<b>74</b>	<b>96</b>	<b>96</b>	<b>77%</b>	<b>77%</b>
<b>R-squared</b>			<b>0.4037</b>	<b>0.4037</b>		

SECTION III – DEMOGRAPHIC ASSUMPTIONS  
DISABILITY RATES

Chart III-D1

General Disability Incidence

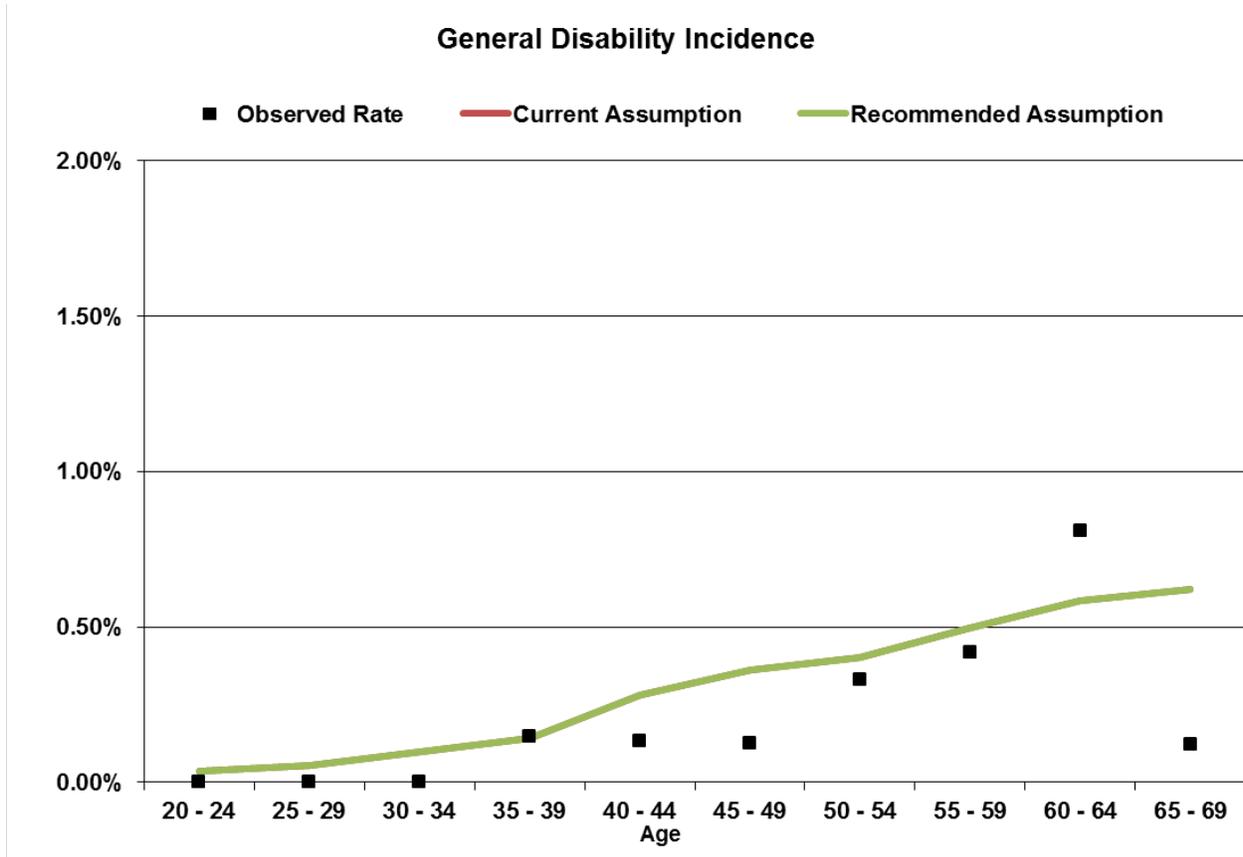


Table III-D2 on the next page shows the calculation of actual-to-expected ratios and the r-squared statistic for Safety members, and Chart III-D2 shows the information graphically. The 90% confidence interval is not shown because of a lack of credible data.

The data shows that the number of disabilities are close to the number expected under the current assumption. However, the current rates do not assume any disabilities past age 59, and several have occurred in the last three years. We recommend setting a rate of 1.5% for Safety disabilities from age 50 onward. We are not proposing any other changes to the total disability assumption for Safety members.

Since Safety disability rates were combined during this review and given a flat rate of 1.5% from age 50 onward, it's necessary to define what percent of disabilities are nonservice-connected and service-connected. As of January 1, 2016, there are 210 disabled Safety retirees. 93.3% (196 out of 210) of disabled Safety retirees are retired due to service-connected disabilities. We are recommending that 95% of Safety disabilities are assumed to be service-connected, and to assume a refund of contributions for nonservice-connected disabilities before a member reaches five years of service.

See Appendix A or B for a full listing of the rates.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

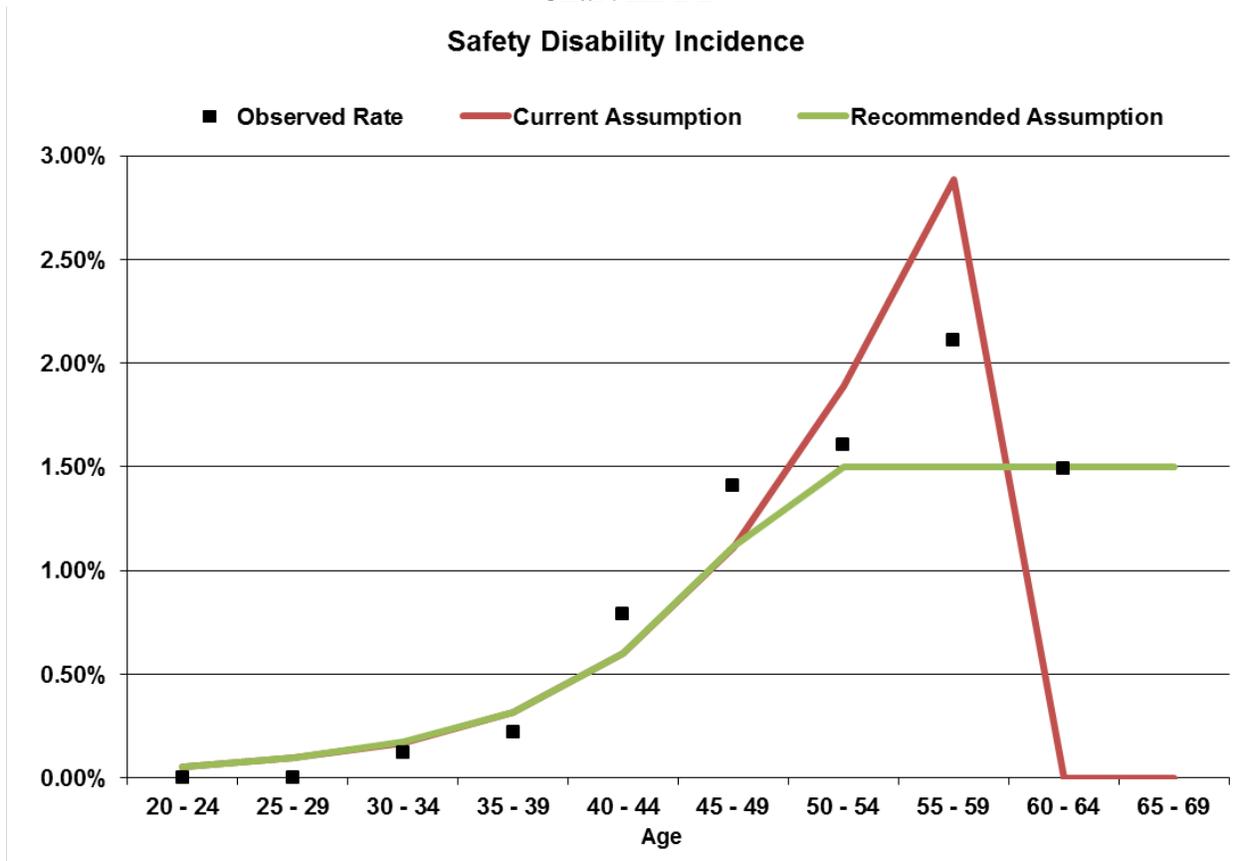
**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
DISABILITY RATES**

**Table III-D2**

Safety Disability Incidence Rates							
Age Band	Exposures	Disabilities			Actual to Expected Ratios		
		Actual	Current	Recommended	Current	Recommended	
20 - 24	62	0	0	0	0%	0%	
25 - 29	531	0	1	1	0%	0%	
30 - 34	840	1	1	1	70%	70%	
35 - 39	903	2	3	3	70%	70%	
40 - 44	888	7	5	5	132%	131%	
45 - 49	710	10	8	8	127%	126%	
50 - 54	623	10	12	9	85%	107%	
55 - 59	284	6	8	4	73%	141%	
60 - 64	134	2	-	2	0%	100%	
65 - 69	27	1	-	0	0%	247%	
70 +	1	0	-	0	0%	0%	
<b>Total</b>	<b>5,003</b>	<b>39</b>	<b>38</b>	<b>34</b>	<b>103%</b>	<b>114%</b>	
<b>R-squared</b>			<b>0.0536</b>	<b>0.0474</b>			

**Chart III-D2**

**Safety Disability Incidence**



**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
MORTALITY RATES**

Post-retirement mortality assumptions are typically developed separately by gender for both healthy annuitants and disabled annuitants. Pre-retirement mortality assumptions are developed separately for males and females. Unlike most of the other demographic assumptions that rely exclusively on the experience of the plan, for mortality, standard mortality tables and projection scales serve as the primary basis for the assumption.

The Society of Actuaries recently completed an extensive mortality study and updated their mortality tables and mortality improvement projection scale, the most recent of which is named the MP-2015 scale. CalPERS also recently released a set of mortality tables based on California public plan experience. We used these tables as the basis for our analysis.

The steps in our analysis are as follows:

1. Select a standard mortality table that is, based on experience, most closely matching the anticipated experience of SJCERA.
2. Compare actual SJCERA experience to what would have been predicted by the selected standard table for the period of the experience study.
3. Adjust the standard table either fully or partially depending on the level of credibility for SJCERA experience. This adjusted table is called the base table.
4. Select an appropriate standard mortality improvement projection scale and apply it to the base table.

As we have done in prior experience studies, we have combined the experience of the past three years with that of the prior three-year period in order to have a more robust dataset to review.

Historically we have proposed assumption changes when the Actual-to-Expected (A/E) ratio for the current assumption is less than 100%. However, beginning with the 2010-2013 Experience Study, we recommended a change in this approach going forward, where the proposed assumptions are intended to track closely to actual experience (i.e. an A/E ratio close to 100%, but with a ratio slightly less than 100% still being reasonable). However, as described below, this approach also includes an expectation that the assumed mortality rates will automatically become more conservative each year, since the actual mortality rates are also expected to decrease over time.

We also historically recommended the same or a related table for active employees and healthy annuitants, which has been the current practice for SJCERA. However, recent mortality studies by the Society of Actuaries and others have shown significantly lower rates of mortality for active employees versus those of the same age who are no longer working, therefore this year we have suggested using separate tables for active versus retired members.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
MORTALITY RATES**

In the prior study, SJCERA elected to use the following assumptions:

**Healthy active members, retirees, and beneficiaries**

- The Combined Healthy Retired Pensioners (RP) 2000 tables published by the Society of Actuaries, with generational projection using Projection Scale BB.

**Disabled members**

- The Combined Healthy Retired Pensioners (RP) 2000 tables published by the Society of Actuaries, with generational projection using Projection Scale BB, set-forward eight years for males and females.

Since the prior study, the Society of Actuaries' Retirement Plans Experience Committee (RPEC) has released a new mortality improvement scale, Scale MP-2015, which reflects more up-to-date data than was used in the development of Scale BB.

MP-2015 represents the Society of Actuaries' most advanced actuarial methodology in incorporating mortality improvement trends with actual recent mortality rates, by using rates that vary not only by age but also by calendar year – known as a two-dimensional approach to projecting mortality improvements. Scale MP-2015 was designed with the intent of being applied to mortality on a generational basis. The effect of this is to build in an automatic expectation of future improvements in mortality.

This is a different approach from building in a margin for conservatism in the current rates to account for the expectation that the same rates will be applied in future years, when mortality experience has improved. Recent reports issued by RPEC suggest that using generational mortality is a preferable approach, as it allows for an explicit declaration of the amount of future mortality improvement included in the assumptions.

RPEC has also recently released a new set of base mortality rate tables – the RP-2014 tables, which are intended to replace the RP-2000 tables and are based on a recent study of US defined benefit plan mortality experience. However, RPEC excluded all public pension plan data in the construction of these tables - including a large amount of California public sector data - because there were significant differences between the private and public sector retirement experience, and the new tables are expected to be used by private sector plans to meet accounting and federal funding requirements specific to private plans.

Fortunately, there are alternative sets of assumptions that have been developed that may serve as a logical basis for developing mortality assumptions for SJCERA. As part of an Experience Study completed in 2014, CalPERS adopted a new set of mortality tables for active, retired, and disabled members. SJCERA's experience over the past six years matches well with the new CalPERS rates, after removing the improvement projections included by CalPERS and replacing them with the new MP-2015 mortality improvement projections through the mid-point of the six-year period (2010-2016).

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
MORTALITY RATES**

Even with the use of six years of data, the SJCERA experience is only partially credible, based on standard statistical theory. We therefore recommend partially adjusting the CalPERS base tables to fit SJCERA's experience to develop a new base table. The rates for each age in the standard table are adjusted by a factor, where the factor is determined by multiplying the actual-to-expected ratio for the group (such as male retirees) by a credibility factor which will bring the A/E results closer – but not all the way – to 100%.

Based on these adjustments, we are recommending the following base mortality table assumptions:

**Active members**

- CalPERS Preretirement Non-Industrial Mortality, with no adjustment (General and Safety).
- CalPERS Preretirement Industrial Mortality, with no adjustment (Safety only).

**Healthy retirees and beneficiaries**

- CalPERS Healthy Annuitant Mortality, adjusted 110% by for Safety and no adjustment for General.

**Disabled members**

- CalPERS Industrially Disabled Annuitant Mortality, with no adjustment (Safety only)
- CalPERS Non-Industrially Disabled Annuitant Mortality, adjusted by 105% (General only).

We also recommend projecting these base tables generationally using the MP-2015 mortality improvement scale described above for all types of mortality.

As shown in Table III-M1 on the following page, our proposed mortality rates for healthy annuitants are close to recent experience, in particular for the General members. As described above, we applied a partial adjustment to the Safety healthy retiree mortality rates and the General disabled mortality rates to bring the A/E rates closer to 100%. However, these rates still reflect a margin for conservatism, because the SJCERA data cannot be considered fully credible, particularly for the disability mortality experience. To perform our comparisons, the CalPERS base rates (without projection) were projected from their base year (2009) to the midpoint of the combined six-year study period (2013).

SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
MORTALITY RATES**

**Table III-M1**

Annuitant Mortality for all Groups										
Annuitant Type	Exposures	Actual Deaths	Weighted Exposures	Weighted Deaths				Actual to Expected Ratios		
				Actual	Current	Standard	Recommended	Current	Standard	Recommended
General Healthy Females	13,633	388	315,874,672	7,055,481	7,408,433	7,003,822	7,003,822	95%	101%	101%
General Healthy Males	7,104	223	228,679,085	5,812,172	6,511,784	6,119,749	6,119,749	89%	95%	95%
<b>General Healthy Total</b>								<b>92%</b>	<b>98%</b>	<b>98%</b>
Safety Healthy Females	1,260	27	48,288,992	885,488	752,737	725,754	798,330	118%	122%	111%
Safety Healthy Males	2,288	52	140,432,323	2,799,493	2,210,257	2,175,350	2,392,885	127%	129%	117%
<b>Safety Healthy Total</b>								<b>124%</b>	<b>127%</b>	<b>115%</b>
General Disabled Females	1,372	52	25,912,701	958,409	709,409	622,088	653,193	135%	154%	147%
General Disabled Males	740	34	17,771,195	816,888	588,971	578,627	607,558	139%	141%	134%
<b>General Disabled Total</b>								<b>137%</b>	<b>148%</b>	<b>141%</b>
Safety Disabled Females	289	0	10,549,344	0	129,981	76,514	76,514	0%	0%	0%
Safety Disabled Males	859	17	40,637,978	712,424	1,378,344	711,508	711,508	52%	100%	100%
<b>Safety Disabled Total</b>								<b>47%</b>	<b>90%</b>	<b>90%</b>
<b>Total</b>	<b>27,545</b>	<b>793</b>	<b>828,146,290</b>	<b>19,040,354</b>	<b>19,689,914</b>	<b>18,013,412</b>	<b>18,363,558</b>	<b>97%</b>	<b>106%</b>	<b>104%</b>

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
MORTALITY RATES**

Rather than weighting the experience based on the number of members living and dying, we have weighted the experience based on benefit size (salary for current active members). This approach has been recommended by RPEC, since members with larger benefits are expected to live longer, and a benefit-weighted approach helps avoid underestimating the liabilities.

The match between the actual and expected experience across all statuses (active, retired, and disabled) is close under the proposed assumptions: 104%. We are comfortable that the ratio of actual to expected deaths is less than 100% within some subgroups, since as described above, the use of generational mortality assumptions will automatically result in assumed mortality rates that decrease over time.

**Mortality Assumptions for Employee Contribution Rates**

For purposes of determining employee contribution rates, the use of generational mortality improvements is impractical from an administrative perspective. Therefore, we recommend using the base mortality tables described above (various CalPERS tables with SJCERA-specific adjustments) projected using Scale MP-2015 from 2009 to 2038 for General Members and to 2040 for Safety Members. These static projections are intended to approximate generational mortality improvements.

The projection periods are based upon the duration of active liabilities for the respective impacted groups, and the period during which the associated employee contribution rates will be in use. The employee contribution rates are also blended using a male/female weighting of 29%/71% for General Members and 75% /25% for Safety members.

We anticipate that these mortality assumptions will be used to determine the employee contribution rates in effect for the period of January 1, 2017 through December 31, 2019. We also anticipate that the mortality assumptions for this purpose will be updated again after the next experience study covering the period from January 1, 2016 through December 31, 2018.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
OTHER DEMOGRAPHIC ASSUMPTIONS**

**TERMINAL PAY**

The prior experience study demonstrated that Sick Leave Bank service is unlikely to have a significant impact on benefits. We have updated our analysis for the current study period, and confirmed that this conclusion is still valid.

**Table III-O1**

	Count	Avg Years of Service	Avg Sick Leave Hours	Avg Add'l Service	Percent Increase
Eligible	176	20.1	709	0.3	1.70%
Ineligible	5,748	10.5	0	0.0	0.00%
Total	5,924	10.8	21	0.0	0.09%

We also performed a comparison of the actual versus expected final average pay used in the service retirement benefit calculations to confirm any other substantial/recurring terminal pay increases. For all service retirements which occurred over the past three years, we compared the actual final average pay used in the member's benefit calculation to the expected final average pay for that member reflected in the prior actuarial valuation (as an active member) and found no significant difference. Therefore, we do not recommend the application of any additional terminal pay increase.

**Table III-O2**

Valuation Date	Retirements from Active Status	Total Final Average Pay	Expected Final Average Pay	Actual / Expected
<b>General</b>				
1/1/2014	155	11,454,408	11,221,472	102.08%
1/1/2015	196	16,083,768	15,949,326	100.84%
1/1/2016	170	12,279,168	12,222,853	100.46%
	521	39,817,344	39,393,651	101.08%
<b>Safety</b>				
1/1/2014	14	1,313,280	1,314,062	99.94%
1/1/2015	24	2,241,264	2,221,700	100.88%
1/1/2016	45	4,878,996	4,911,305	99.34%
<b>Total</b>	<b>83</b>	<b>8,433,540</b>	<b>8,447,066</b>	<b>99.84%</b>

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
OTHER DEMOGRAPHIC ASSUMPTIONS**

**FAMILY COMPOSITION**

The current assumption is that 70% of active male and 50% of active female SJCERA participants will have beneficiaries eligible for an unreduced (i.e. subsidized) 60% Joint and Survivor allowance (100% for Duty Disability). Table III-O3 shows the results of the analysis during the experience study period for members who retired or became disabled.

**Table III-O3**

Percent of Retired and Disabled Members with Spouses or Domestic Partners						
Calendar Year	Disabled and Retirees	Females		Males		
		Eligible Spouses	Percent Eligible	Disabled and Retirees	Eligible Spouses	Percent Eligible
2013	132	67	50.8%	89	66	74.2%
2014	162	85	52.5%	108	73	67.6%
2015	141	87	61.7%	124	99	79.8%
Total	435	239	54.9%	321	238	74.1%

We recommend increasing the assumed percentage of active members who are married or have a domestic partner at retirement or when they become disabled by 5% for males and females to 75% and 55%, respectively. This assumption will also be applied to determine the number of active members eligible for a pre-retirement surviving spouse death benefit.

The current assumption is that male spouses are three years older than their wives. Table III-O4 compiles the average age difference for retired or disabled members between spouses and domestic partners. This information is used to predict spouse information for future retirees. We recommend changing the assumption so that the spouse of a male member is expected to be four years younger while the spouse of a female member is expected to be two years older.

**Table III-O4**

Age Difference Between Retired or Disabled Members and Their Spouses or Domestic Partners								
Calendar Year	Eligible Spouses	Females			Males			
		Member Age	Spouse Age	Difference	Eligible Spouses	Member Age	Spouse Age	Difference
2013	67	59.10	59.40	(0.30)	66	58.97	56.00	2.97
2014	85	60.20	62.83	(2.63)	73	53.52	50.08	3.44
2015	87	59.28	61.47	(2.19)	99	68.76	64.29	4.47
Total	239	59.56	61.37	(1.81)	238	61.37	57.63	3.74

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**SECTION III – DEMOGRAPHIC ASSUMPTIONS  
OTHER DEMOGRAPHIC ASSUMPTIONS**

**PLAN EXPENSES**

An allowance of \$4,243,600 for Plan administrative expenses was included in the annual cost calculation in the prior valuation, and was expected to increase with CPI by 3% to \$4,370,908. The Plan's administrative expenses, adjusted for CPI increases to the current year, have averaged a little more than \$4.3 million during the last three years. We recommend maintaining the Plan's assumed administrative expenses of \$4,370,908 for 2016, to be split between employees and employers based on their share of the overall contributions. Expenses are expected to grow with the cost of living (by 2.90% per year) in future years.

<b>Calendar Year</b>	<b>Admin Expense</b>	<b>Bay Area CPI</b>	<b>Admin Expense w/ CPI to 2016</b>
2013	\$ 4,134,716	2.25%	\$ 4,460,461
2014	\$ 4,042,986	2.85%	\$ 4,265,490
2015	\$ 4,075,745	2.58%	\$ 4,180,748
Average	\$ 4,084,482		\$ 4,302,233

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS**

The recommended assumptions were adopted by the Board at their August 17, 2016 meeting. The demographic assumptions are based on an experience study covering the period from January 1, 2013 through December 31, 2015.

**1. Rate of Return**

Assets are assumed to earn 7.40% net of investment expenses.

**2. Administrative Expenses**

Administrative expenses are assumed to be \$4,370,908 for the next year, to be split between employees and employers based on their share of the overall contributions. Expenses are expected to grow with the cost of living (by 2.90% per year.)

**3. Cost of Living**

The cost of living as measured by the Consumer Price Index (CPI) will increase at the rate of 2.90% per year.

**4. Post Retirement COLA**

Benefits are assumed to increase after retirement at the rate of 2.6% per year.

**5. Increases in Pay**

Assumed pay increases for active Members consist of increases due to base salary adjustments plus service-based increase due to longevity and promotion, as shown below:

Pay Increases										
	Years of Service									
	0	1	2	3	4	5	6	7	8-29	30+
<b>Base Increase</b>	3.15%	3.15%	3.15%	3.15%	3.15%	3.15%	3.15%	3.15%	3.15%	3.15%
<b>Longevity &amp; Promotion</b>										
<b>General</b>	6.00%	5.00%	4.00%	3.00%	2.00%	1.50%	1.00%	0.75%	0.50%	0.00%
<b>Safety</b>	7.00%	6.00%	5.00%	4.00%	3.00%	2.25%	1.25%	1.25%	1.25%	1.25%
<b>Total (Compound)</b>										
<b>General</b>	9.34%	8.31%	7.28%	6.24%	5.21%	4.70%	4.18%	3.92%	3.67%	3.15%
<b>Safety</b>	10.37%	9.34%	8.31%	7.28%	6.24%	5.47%	4.44%	4.44%	4.44%	4.44%

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS**

**6. Family Composition**

Percentage married for all active members who retire, become disabled, or die during active service is shown in the following table. Male members are assumed to be four years older than their spouses, and female members are assumed to be two years younger than their spouses.

Percentage Married	
Gender	Percentage
Males	75%
Females	55%

**7. Rates of Termination**

Sample rates of termination are show in the following table.

Rates of Termination*		
Years of Service	General	Safety
0	17.50%	10.00%
1	11.00%	7.75%
2	10.00%	5.75%
3	7.75%	5.00%
4	6.75%	4.50%
5	6.25%	2.00%
6	6.00%	1.75%
7	4.50%	1.50%
8	4.50%	1.50%
9	3.75%	1.50%
10	3.75%	0.75%
11-12	2.75%	0.75%
13-19	2.50%	0.75%
20-29	1.00%	0.00%
30+	0.00%	0.00%

\* Termination rates do not apply once a member is eligible for retirement.

**8. Withdrawal**

Rates of withdrawal apply to active Members who terminate their employment and withdraw their member contributions, forfeiting entitlement to future Plan benefits.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS**

60% of all General Member terminations with less than five years of service, 30% of those with five to 14 years of service, and 10% of those with more than 15 years of service, are assumed to take a refund of contributions.

60% of all Safety Member terminations with less than five years of service, 10% of those with five to 14 years of service, and none of those with more than 15 years of service, are assumed to take a refund of contributions.

**9. Vested Termination and Reciprocal Transfers**

Rates of vested termination apply to active Members who terminate their employment and leave their member contributions on deposit with the Plan.

40% of all General Member terminations with less than five years of service, 70% of those with five to 14 years of service, and 90% of those with more than 15 years of service, are assumed to leave their contributions on deposit.

40% of all Safety Member terminations with less than five years of service, 90% of those with five to 14 years of service, and 100% of those with more than 15 years of service, are assumed to leave their contributions on deposit.

Vested terminated General Members are assumed to begin receiving benefits at age 58; vested terminated Safety Members are assumed to begin receiving benefits at age 50.

25% of vested terminated General Members and 50% of vested terminated Safety Members are assumed to be reciprocal.

Final average pay for General Members who terminate with reciprocity is assumed to increase by 3.67% per year until their assumed retirement date. Final average pay for Safety Members who terminate with reciprocity is assumed to increase by 4.44% per year until their assumed retirement date.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS**

**10. Rates of Service-Connected Disability**

Sample service-connected disability rates of active participants are provided in the table below.

Rates of Svc Disability				
	General	General	Safety	Safety
Age	Male	Female	Male	Female
22	0.066%	0.022%	0.048%	0.048%
27	0.066%	0.030%	0.086%	0.089%
32	0.066%	0.051%	0.161%	0.166%
37	0.066%	0.073%	0.296%	0.305%
42	0.380%	0.094%	0.565%	0.592%
47	0.380%	0.123%	1.023%	1.101%
52	0.226%	0.159%	1.425%	1.425%
57	0.226%	0.204%	1.425%	1.425%
62	0.226%	0.249%	1.425%	1.425%

**11. Rates of Nonservice-Connected Disability**

Sample nonservice-connected disability rates of active participants are provided in the table below.

Rates of Non-Svc Disability				
	General	General	Safety	Safety
Age	Male	Female	Male	Female
22	0.051%	0.053%	0.003%	0.003%
27	0.068%	0.067%	0.005%	0.005%
32	0.086%	0.081%	0.008%	0.009%
37	0.108%	0.102%	0.016%	0.016%
42	0.138%	0.138%	0.030%	0.031%
47	0.178%	0.197%	0.054%	0.058%
52	0.225%	0.267%	0.075%	0.075%
57	0.286%	0.337%	0.075%	0.075%
62	0.362%	0.408%	0.075%	0.075%

**12. Rates of Mortality for Healthy Lives**

Mortality rates for active members are based on the sex distinct CALPERS Preretirement Non-Industrial Mortality Table, with generational mortality improvements projected from 2009 using Projection Scale MP-2015, published by the Society of Actuaries.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS**

Mortality rates for healthy annuitants are based on the sex distinct CALPERS Healthy Annuitant Mortality Table, with no adjustment for General members and a partial credibility adjustment of 1.10 for Safety members, with generational mortality improvements projected from 2009 using Projection Scale MP-2015, published by the Society of Actuaries.

Mortality rates for active members who die in the line-of-duty are based on the sex distinct CALPERS Preretirement Industrial Mortality Table, with generational mortality improvements projected from 2009 using Projection Scale MP-2015, published by the Society of Actuaries.

**13. Rates of Mortality for Disabled Retirees**

Mortality rates for Safety disabled annuitants are based on the sex distinct CALPERS Industrially Disabled Annuitant Mortality Table, with no adjustment, with generational mortality improvements projected from 2009 using Projection Scale MP-2015, published by the Society of Actuaries.

Mortality rates for General disabled annuitants are based on the sex distinct CALPERS Non-Industrially Disabled Annuitant Mortality Table, with a partial credibility adjustment of 1.05, with generational mortality improvements projected from 2009 using Projection Scale MP-2015, published by the Society of Actuaries.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**APPENDIX A – SUMMARY OF PROPOSED ASSUMPTIONS**

**14. Rates of Retirement**

Rates of retirement are based on age according to the following table.

Rates of Retirement								
Age	General Male Years of Service			General Female Years of Service			Safety Years of Service	
	5-9	10-29	30+	5-9	10-29	30+	10-19	20+
45	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%
46	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%
47	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%
48	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%
49	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%
50	3.25%	4.00%	5.00%	3.50%	3.50%	4.50%	10.00%	15.00%
51	3.25%	4.00%	5.00%	3.50%	3.50%	4.50%	5.00%	10.00%
52	3.25%	4.00%	5.00%	3.50%	3.50%	4.50%	5.00%	10.00%
53	3.25%	4.00%	5.00%	3.50%	3.50%	4.50%	5.00%	20.00%
54	3.25%	4.00%	5.00%	3.50%	3.50%	4.50%	5.00%	20.00%
55	4.00%	8.50%	15.00%	3.50%	3.50%	4.50%	5.00%	30.00%
56	4.00%	4.00%	15.00%	3.50%	7.00%	15.00%	5.00%	20.00%
57	4.00%	4.00%	15.00%	3.50%	7.00%	15.00%	5.00%	20.00%
58	4.00%	4.00%	20.00%	3.50%	7.00%	15.00%	5.00%	20.00%
59	4.00%	15.00%	25.00%	3.50%	7.00%	15.00%	5.00%	20.00%
60	4.00%	15.00%	25.00%	7.50%	12.50%	15.00%	5.00%	20.00%
61	7.50%	17.50%	35.00%	7.50%	12.50%	25.00%	25.00%	25.00%
62	7.50%	30.00%	40.00%	7.50%	25.00%	30.00%	25.00%	50.00%
63	7.50%	25.00%	35.00%	7.50%	25.00%	35.00%	25.00%	50.00%
64	7.50%	25.00%	35.00%	7.50%	25.00%	40.00%	25.00%	50.00%
65	15.00%	25.00%	50.00%	15.00%	25.00%	40.00%	100.00%	100.00%
66	15.00%	35.00%	50.00%	15.00%	25.00%	40.00%	100.00%	100.00%
67	15.00%	30.00%	40.00%	15.00%	25.00%	40.00%	100.00%	100.00%
68	15.00%	30.00%	30.00%	15.00%	25.00%	40.00%	100.00%	100.00%
69	15.00%	30.00%	30.00%	15.00%	25.00%	40.00%	100.00%	100.00%
70	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS**

The following are the assumptions used in the actuarial valuation as of January 1, 2015. The actuarial assumptions were adopted by the Board based on recommendations included in an Experience Study performed by Cheiron covering the period from 2010 through 2012.

**1. Rate of Return**

Assets are assumed to earn 7.50% net of investment expenses.

**2. Administrative Expenses**

Administrative expenses are assumed to be \$4,243,600 for the next year, to be split between employees and employers based on their share of the overall contributions. Expenses are expected to grow with the cost of living (by 3.00% per year.)

**3. Cost of Living**

The cost of living as measured by the Consumer Price Index (CPI) will increase at the rate of 3.00% per year.

**4. Post Retirement COLA**

Benefits are assumed to increase after retirement at the rate of 2.6% per year.

**5. Increases in Pay**

Assumed pay increases for active Members consist of increases due to base salary adjustments plus service-based increase due to longevity and promotion, as shown below:

	Pay Increases		
	Years of Service		
	<5	5-29	30+
<b>Base Increase</b>	3.25%	3.25%	3.25%
<b>Longevity &amp; Promotion</b>			
<b>General</b>	3.86%	0.96%	0.00%
<b>Safety</b>	4.83%	1.93%	1.93%
<b>Total (Compound)</b>			
<b>General</b>	7.24%	4.24%	3.25%
<b>Safety</b>	8.24%	5.24%	5.24%

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS**

**6. Family Composition**

Percentage married for all active members who retire, become disabled, or die during active service is shown in the following table. Female members are assumed to be three years younger than male members.

Percentage Married	
Gender	Percentage
Males	70%
Females	50%

**7. Rates of Termination**

Sample rates of termination are show in the following table.

Rates of Termination*		
Years of Service	General	Safety
0	12.75%	8.75%
1	10.00%	7.75%
2	10.00%	5.75%
3	7.75%	2.75%
4	4.75%	2.75%
5	4.50%	2.00%
6	4.50%	2.00%
7	4.50%	2.00%
8	3.75%	2.00%
9	3.00%	2.00%
10-19	2.00%	1.00%
20-29	1.00%	0.00%
30+	0.00%	0.00%

\* Termination rates do not apply once a member is eligible for retirement.

**8. Withdrawal**

Rates of withdrawal apply to active Members who terminate their employment and withdraw their member contributions, forfeiting entitlement to future Plan benefits.

50% of all General Member terminations with less than five years of service are assumed to take a refund of contributions, as well as 35% of those with five to 14 years of service.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS**

20% of all Safety Member terminations with less than five years of service are assumed to take a refund of contributions and 10% of those between five and 14 years are assumed to take a refund.

**9. Vested Termination and Reciprocal Transfers**

Rates of vested termination apply to active Members who terminate their employment and leave their member contributions on deposit with the Plan.

50% of all General Member terminations with less than five years of service are assumed to leave their contributions on deposit, as well as 65% of those with five to 14 years of service, and 100% of those with 15 or more years of service.

80% of all Safety Member terminations with less than five years of service are assumed to leave their contributions on deposit, as well as 90% of those between five and 14 years of service and 100% of those with 15 or more years of service.

Vested terminated General Members are assumed to begin receiving benefits at age 58; terminated Safety Members are assumed to begin receiving benefits at age 53.

25% of vested terminated General Members and 50% of vested terminated Safety Members are assumed to be reciprocal.

Final average pay for General Members who terminate with reciprocity is assumed to increase by 4.25% per year until their assumed retirement date. Final average pay for Safety Members who terminate with reciprocity is assumed to increase by 5.25% per year until their assumed retirement date.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS**

**10. Rates of Service-Connected Disability**

Sample service-connected disability rates of active participants are provided in the table below.

<b>Rates of Svc Disability</b>			
	<b>General</b>	<b>General</b>	
<b>Age</b>	<b>Male</b>	<b>Female</b>	<b>Safety</b>
22	0.066%	0.022%	0.050%
27	0.066%	0.030%	0.088%
32	0.066%	0.051%	0.165%
37	0.066%	0.073%	0.302%
42	0.380%	0.094%	0.566%
47	0.380%	0.123%	0.995%
52	0.226%	0.159%	1.713%
57	0.226%	0.204%	2.633%
62	0.226%	0.249%	0.000%

**11. Rates of Nonservice-Connected Disability**

Sample nonservice-connected disability rates of active participants are provided in the table below.

<b>Rates of Non-Svc Disability</b>				
	<b>General</b>	<b>General</b>	<b>Safety</b>	<b>Safety</b>
<b>Age</b>	<b>Male</b>	<b>Female</b>	<b>Male</b>	<b>Female</b>
22	0.051%	0.053%	0.000%	0.000%
27	0.068%	0.067%	0.003%	0.006%
32	0.086%	0.081%	0.005%	0.010%
37	0.108%	0.102%	0.009%	0.019%
42	0.138%	0.138%	0.028%	0.057%
47	0.178%	0.197%	0.082%	0.164%
52	0.225%	0.267%	0.167%	0.334%
57	0.286%	0.337%	0.265%	0.529%
62	0.362%	0.408%	0.000%	0.000%

**APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS**

**12. Rates of Mortality for Healthy Lives**

Mortality rates for active members, retirees, beneficiaries, terminated vested, and reciprocal members are based on the sex distinct Retired Pensioner (RP) 2000 Combined Healthy Tables, published by the Society of Actuaries, with Generational Projection using Projection Scale BB.

**13. Rates of Mortality for Disabled Retirees**

Mortality rates for active members, retirees, beneficiaries, terminated vested, and reciprocal members are based on the sex distinct Retired Pensioner (RP) 2000 Combined Healthy Tables, published by the Society of Actuaries, with Generational Projection using Projection Scale BB, set-forward eight years for males and females.

**SAN JOAQUIN COUNTY EMPLOYEES' RETIREMENT ASSOCIATION  
EXPERIENCE STUDY AS OF DECEMBER 31, 2015**

**APPENDIX B – SUMMARY OF PRIOR ASSUMPTIONS**

**14. Rates of Retirement**

Rates of retirement are based on age according to the following table.

Rates of Retirement								
Age	General Male Years of Service			General Female Years of Service			Safety Years of Service	
	5-9	10-29	30+	5-9	10-29	30+	10-19	20+
45	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%
46	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%
47	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%
48	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%
49	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.00%
50	5.00%	5.00%	5.00%	5.00%	2.00%	7.00%	10.00%	15.00%
51	5.00%	5.00%	5.00%	5.00%	2.00%	7.00%	5.00%	10.00%
52	5.00%	5.00%	5.00%	5.00%	2.00%	7.00%	5.00%	10.00%
53	5.00%	5.00%	5.00%	5.00%	2.00%	7.00%	5.00%	20.00%
54	5.00%	5.00%	5.00%	5.00%	3.00%	7.00%	5.00%	20.00%
55	5.00%	5.00%	15.00%	5.00%	4.00%	15.00%	5.00%	30.00%
56	5.00%	5.00%	15.00%	5.00%	7.00%	15.00%	5.00%	20.00%
57	5.00%	5.00%	15.00%	5.00%	7.00%	15.00%	5.00%	20.00%
58	5.00%	7.50%	20.00%	5.00%	10.00%	20.00%	5.00%	20.00%
59	5.00%	7.50%	25.00%	5.00%	10.00%	25.00%	5.00%	20.00%
60	7.50%	15.00%	25.00%	7.50%	10.00%	25.00%	5.00%	20.00%
61	7.50%	20.00%	35.00%	7.50%	15.00%	35.00%	25.00%	25.00%
62	7.50%	25.00%	40.00%	7.50%	25.00%	35.00%	25.00%	50.00%
63	7.50%	25.00%	35.00%	7.50%	25.00%	35.00%	25.00%	50.00%
64	7.50%	25.00%	35.00%	7.50%	25.00%	35.00%	25.00%	50.00%
65	15.00%	30.00%	50.00%	15.00%	25.00%	50.00%	100.00%	100.00%
66	15.00%	30.00%	50.00%	15.00%	25.00%	50.00%	100.00%	100.00%
67	15.00%	30.00%	40.00%	15.00%	35.00%	40.00%	100.00%	100.00%
68	15.00%	30.00%	30.00%	15.00%	35.00%	30.00%	100.00%	100.00%
69	15.00%	30.00%	30.00%	15.00%	35.00%	30.00%	100.00%	100.00%
70	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%



*Classic Values, Innovative Advice*