

## **Mendocino County Employees Retirement Association (MCERA)**

### **Actuarial Review of June 30, 2017 Actuarial Valuation and June 30, 2016 Actuarial Experience Study**

**Produced by Cheiron**

**April 2018**

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*Via Electronic Mail*

April 25, 2018

Board of Retirement  
Mendocino County Employees Retirement Association  
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Ukiah, CA 95482

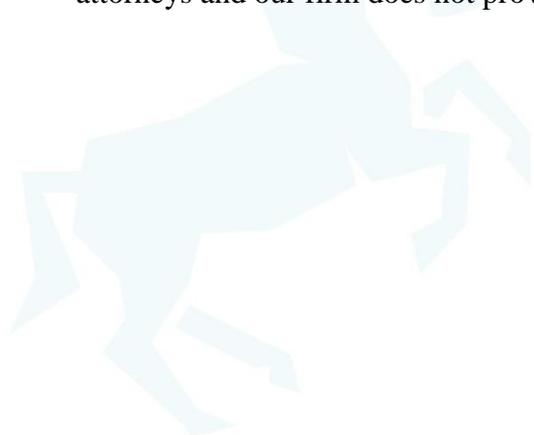
Members of the Board:

Cheiron is pleased to present the results of our actuarial audit of the June 30, 2017 actuarial valuation of the Mendocino County Employees Retirement Association (MCERA) and the triennial Experience Study covering the period from July 1, 2013 to June 30, 2016, both performed by Segal Consulting (Segal). We would like to thank Segal for providing us with information and explanations that facilitated the actuarial audit process and ensured that our findings are accurate and benefit MCERA.

We direct your attention to the executive summary section of our report which highlights the key findings of our review. The balance of the report provides details in support of these findings along with supplemental data, background information, and discussion of the process used in the evaluation of the work performed by Segal.

In preparing our report, we relied on information (some oral and some written) supplied by MCERA and Segal. This information includes, but is not limited to, actuarial assumptions and methods adopted by MCERA, the plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness in accordance with Actuarial Standard of Practice No. 23. A detailed description of all information provided for this review is provided in the body of our report.

We hereby certify that, 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 which 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.



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Mendocino County Employees Retirement Association  
April 25, 2018  
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This report was prepared exclusively for the Mendocino County Employees Retirement Association for the purpose described herein. This report is not intended to benefit any third party, and Cheiron assumes no duty or liability to any such party.

Sincerely,  
Cheiron



Graham A. Schmidt, ASA, EA, FCA, MAAA  
Consulting Actuary



David Holland, FSA, EA, FCA, MAAA  
Consulting Actuary

**ACTUARIAL AUDIT REPORT OF THE  
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**SECTION I – EXECUTIVE SUMMARY**

**Key Findings and Recommendations**

The main findings of our review are as follows:

1. As a result of our efforts, we are able to confirm that the liabilities and costs computed in the valuation as of June 30, 2017 are reasonably accurate and were computed in accordance with generally accepted actuarial principles.
2. We have reviewed the economic and demographic assumptions recommended in the most recent Actuarial Experience Study presented by Segal. In general, we have found them to be reasonable and in accordance with generally accepted actuarial principles. However, we recommend that Segal review the recommendations in one area – mortality – and determine whether additional analysis is merited.

Our primary recommendations are related to the assumptions, and are summarized as follows:

- Cheiron determined the non-economic actuarial assumptions proposed in Segal’s Experience Study to be generally reasonable and in compliance with acceptable standards of actuarial practice. However, as noted above, we believe Segal should review the methodology used to analyze the mortality assumptions:
  - In addition to examining the mortality experience based on the number of members who lived and died, we recommend analyzing the experience by the *benefit amounts*. Actuaries – ourselves included – have found that members with higher benefit amounts tend to live longer, on average. As a result, mortality assumptions based only on the number of deaths potentially understate MCERA liabilities.
  - As a related issue, since Segal recommends the use of base mortality tables derived from the most recent Society of Actuaries pension study (the RP-2014 Mortality Tables Report), we recommend they consider the use of the standard (benefit-weighted) RP-2014 tables, rather than the RP-2014 Headcount-Weighted versions.
  - We recommend that Segal consider how much credibility to assign to the mortality experience of the last five years in developing proposed adjustments to the standard base tables.
  - Segal recommends additional static mortality improvement margin in anticipation of moving to generational mortality projection in a future experience study. We recommend moving to generational projection as soon as practicable.
- Overall, the economic assumptions proposed in Segal’s review represent a reasonable set of assumptions. However, we recommend that Segal clarify the meaning of their “risk adjustment” in developing the investment return assumption. The table in the report showing the “confidence level” over 15 years may be misleading because it overstates the probability of achieving the return on a compound basis.

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**Scope of Assignment**

Cheiron performed a complete independent replication of the MCERA June 30, 2017 actuarial valuation and reviewed the actuarial methods underlying that valuation. We reviewed the census data provided by MCERA staff, and compared it to the information used by Segal in their valuation. We then performed a full parallel valuation, including the calculation of the projected benefits, accrued liability, and normal cost for all MCERA members, and compared the results to those shown in Segal’s actuarial valuation report.

Additionally, Cheiron performed a review of the assumptions recommended by Segal for the June 30, 2017 valuation, as reflected in the actuarial experience study covering the period from July 1, 2013 through June 30, 2016. This review did not constitute a full replication of the experience study; it was focused on a review of the recommendations and communications from Segal, based on the information provided within the study and on additional data provided by Segal based on follow-up requests.

This audit provides MCERA confirmation that:

- The results reported by Segal can be relied upon,
- Segal’s actuarial valuation report, assumptions, and methods comply with Actuarial Standards of Practice (ASOPs),
- The communication of the actuarial valuation results is complete and reasonable, and
- The Board and Segal have considered recommendations and communications that may improve the valuation and experience study.

In a few areas, alternative assumptions should be considered based on review of trends that would be effective in anticipating future experience and could have a material impact on the liabilities and cost of the Plan going forward.

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**SECTION II – SUMMARY OF REVIEW AND RECOMMENDATIONS**

This section summarizes our review of the actuarial valuation and experience study and our recommendations.

**Valuation Procedures**

Overall, we find that the June 30, 2017 actuarial valuation procedures applied in the reporting of the funded status and the determination of the funding requirements based on the current funding policies and adopted assumptions are technically reasonable and conform to the ASOPs. This is based on our review of: the valuation report, the census data used in the valuation and our parallel valuation using the information described above.

**Valuation Results**

Our independent replication of the June 30, 2017 actuarial valuation found no material difference in calculations of plan liabilities, Actuarial Value of Assets, and overall contribution rates from the amounts calculated by Segal based on the adopted assumptions and methods. For the scope of this audit, materiality means the results in the aggregate were within industry standards of plus or minus 5%. Consequently, we conclude that the valuation prepared by Segal for MCERA as of June 30, 2017 is reasonable and can be relied on by the Board for its intended purpose. Our replication of the measures of plan liabilities and costs is summarized in Table II-1 below.

<b>Table II-1</b>			
<b>Summary of Valuation Results as of June 30, 2017</b>			
(\$ in millions)			
	Segal	Cheiron	Ratio
Actuarial Accrued Liability	\$ 679.566	\$ 681.130	100.2%
Actuarial Value of Assets	<u>\$ 480.080</u>	<u>\$ 480.080</u>	100.0%
Unfunded Actuarial Accrued Liability (UAAL)	\$ 199.486	\$ 201.050	100.8%
Funded Percentage	70.6%	70.5%	99.8%
<b>Contribution Rate by Component</b>			
Employer Normal Cost Rate	11.26%	11.06%	98.3%
UAAL Rate	<u>23.66%</u>	<u>23.56%</u>	99.6%
Total Employer Contribution	34.92%	34.62%	99.2%

We note that all results are within 5% of Segal’s calculation.

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**SECTION II – SUMMARY OF REVIEW AND RECOMMENDATIONS**

Our replication of the actuarial accrued liability by Rate Group is shown below in Table II-2. We note that the liabilities by Rate Group are all within the 5% threshold, with the exception of the smaller groups Safety Tier 3 and Probation Tier 3.

<b>Table II-2</b>			
<b>Actuarial Accrued Liability by Rate Group</b>			
(\$ in thousands)			
	Segal	Cheiron	Ratio
<b>General Members</b>			
General Tier 1	\$ 145,046.0	\$ 145,168.7	100.1%
General Tiers 2 & 3	344,461.0	345,740.3	100.4%
General Tier 4	6,509.0	6,469.7	99.4%
<b>Safety Members</b>			
Safety Tier 1	\$ 43,729.0	\$ 43,759.3	100.1%
Safety Tier 2	107,531.0	107,949.9	100.4%
Safety Tier 3	1,218.0	1,123.0	92.2%
<b>Probation Members</b>			
Probation Tier 1	\$ 6,662.0	\$ 6,663.6	100.0%
Probation Tier 2	24,062.0	23,957.4	99.6%
Probation Tier 3	348.0	298.4	85.7%
<b>Combined</b>	<b>\$ 679,566.0</b>	<b>\$ 681,130.3</b>	<b>100.2%</b>

For the new Safety and Probation tiers, the current active members have very low levels of service on average (2.1 years and 1.6 years, respectively), which can lead to larger differences in the Actuarial Liability. It is not unusual to see larger differences in accrued liability and normal cost for newer groups, as a result of minor differences in how valuation systems apply various elements used in the allocation of costs between past and future service, such as the rounding of entry ages and service amounts. As the size of the PEPRA population grows, and as these members accumulate more service, the percentage differences between different valuation systems should decline significantly.

Our replication of the employer contribution rates by Rate Group is shown on the next page in Table II-3. We note that the employer rates by Rate Group are all within the 5% threshold, even for the newer Safety and Probation tiers.

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<b>Table II-3 Comparison of Employer Contribution Rates</b>			
	<b>Segal</b>	<b>Cheiron</b>	<b>Ratio</b>
<b>General Members</b>			
General Tier 1	34.39%	33.64%	97.8%
General Tiers 2 & 3	31.46%	30.75%	97.7%
General Tier 4	28.31%	28.67%	101.3%
<b>Safety Members</b>			
Safety Tier 1	N/A	N/A	
Safety Tier 2	62.78%	61.96%	98.7%
Safety Tier 3	52.47%	53.27%	101.5%
<b>Probation Members</b>			
Probation Tier 1	N/A	N/A	
Probation Tier 2	35.95%	35.81%	99.6%
Probation Tier 3	29.20%	29.50%	101.0%
<b>Combined</b>	<b>34.92%</b>	<b>34.62%</b>	<b>99.2%</b>

**Employee Contribution Rates**

As part of the audit, we replicated the calculations of the individual employee contribution rates based on the applicable provisions of the County Employees Retirement Law (the CERL) and our understanding of additional cost-sharing as described in the valuation report. For the Non-PEPRA (Legacy) tiers, we understand the employee contribution rates to be made up of the following components:

- A Basic rate providing for an annuity equal to
  - 1/100th (General Tier 1) of One Year Final Average Compensation at a retirement age of 60, or
  - 1/100th (General Tiers 2 and 3) of Three Year Final Average Compensation at a retirement age of 60, or
  - 1/100th (Safety and Probation Tiers 1 and 2) of Three Year (One Year for Tier 1) Final Average Compensation at a retirement age of 50, and
- A COLA rate providing for one-half of the cost of the COLA (offset by 1.63% of pay, which is picked up by the County, for Safety members).

Non-PEPRA members with 30 or more years of service are exempt from paying member contributions.

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We have verified the calculations of the individual employee contribution rates based on the applicable provisions of the CERL and generally have found these rates to be correct. Our Basic (non-COLA) rates were within 0.02% of Segal’s rates for all Legacy tiers. We checked the COLA loading factors for all Legacy Tiers and the total rates (basic plus COLA) were within 5% for all Tiers.

The total member rates computed for the new PEPRA tiers are designed to provide for 50% of the total normal cost rate within each Rate Group. We checked that the total member rates determined by Segal meet this requirement.

The Segal methodology is commonly used by ’37 Act systems (determining Basic rates and then applying a COLA load based on each years’ valuation results) and appears to meet the requirement that “*Any increases in contribution shall be shared equally between the county or district and the contributing members*” (CERL 31873). However, we have previously shared with Segal’s consultants an alternative methodology for determining employee COLA contribution rates, which involves calculating a distinct COLA rate for each individual entry-age, rather than applying a certain percentage load to the Basic rates. This methodology has the advantage of avoiding annual changes to the COLA contribution rates; the COLA rates will only change if there is a modification to the benefit provisions or actuarial assumptions.

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**Census Data**

Both the MCERA Staff and Segal provided us with the data that was used in the June 30, 2017 actuarial valuation. We reviewed the information in both files, and reviewed the data questions provided to MCERA by Segal and the MCERA responses.

We find that the data used in the valuation is valid, complete, and contains the necessary data elements for purposes of performing the actuarial valuation of MCERA. In Table II-4 below we include an exhibit comparing the processed June 30, 2017 data file – as modified appropriately based on the MCERA responses to Segal’s questions, as noted in Segal’s report and in follow-up communications for issues such as annualization of pay – to the raw data provided by MCERA to Segal and found only very minor differences between the two files. We understand that any discrepancies between these files are the result of the correspondence between Segal and MCERA described in the data questions and answers of which we were provided copies. We also find that the methods and requirements provided in the Actuarial Standard of Practice No. 23 *Data Quality* have been adhered to, to the extent applicable for the valuation of pension plan obligations.

**Table II-4  
Summary of Member Statistics as of June 30, 2017**

	Segal	Cheiron (Raw)	Ratio
<b>Active Members</b>			
Total Number	1,123	1,123	100.0%
Average Age	46.7	46.7	100.0%
Average Service	9.1	9.2	101.1%
Average Projected Compensation	\$ 55,508	\$ 55,698	100.3%
<b>Vested Terminated Members</b>			
Total Number	479	473	98.7%
Average Age	46.7	46.8	100.2%
Service Retirees	1,135	1,135	100.0%
Disabled Retirees	174	174	100.0%
Beneficiaries	153	153	100.0%
Total	1,462	1,462	100.0%
Average Age	69.1	69.1	100.0%
Average Monthly Benefit	\$ 1,846	\$ 1,852	100.3%

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In reviewing the data processes employed in the valuation, we recommend the following improvements to enhance the valuation process:

- a) Cheiron supports Segal's efforts to begin using actual pensionable compensation received during the fiscal year as discussed in footnote (1) on page vi of the June 30, 2017 valuation report. Segal's current practice is to calculate pensionable compensation by annualizing a biweekly pay rate plus other pensionable pay as of the measurement date.
- b) Cheiron recommends showing separate counts for various termination types (non-vested, deferred vested, and terminated with reciprocity). Segal includes all termination types in the deferred vested counts in the valuation. Segal does have an additional status code identifying the different termination types. Cheiron valued the different termination types separately for the replication.

### **Plan Provisions**

We compared the summary of plan provisions shown in Section 4, Exhibit III of Segal's June 30, 2017 valuation report to the benefits as summarized in the *Retirement System Overview & Benefits* section of the MCERA website. In general, the plan provisions shown in the exhibit match the materials on the website, although we do not see mention of the \$1,000 death benefit in Segal's summary.

Based on our close match of the Segal liabilities as part of our parallel valuation, we conclude that Segal has appropriately reflected plan provisions in the actuarial valuation.

### **Actuarial Assumptions**

The June 30, 2017 actuarial valuation results were based on the assumptions ultimately adopted by the MCERA Board, based on recommendations made by Segal in the Actuarial Experience Study covering the three-year period ending June 30, 2016. As part of our actuarial audit review, we have performed a peer review of the experience study and have the following comments and recommendations:

#### **Mortality**

Segal recommended that MCERA adopt mortality assumptions based on updated Society of Actuaries tables for mortality and projection of mortality improvements. Segal suggested the following steps, which are consistent with those used by other actuaries:

1. Select a standard mortality table based on experience most closely matching the anticipated experience of the System.
2. Compare the actual experience of the System to that 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 the System's experience. This adjusted table is called the base table.

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4. Select an appropriate standard mortality improvement projection scale and apply it to the base table.

We support the recommended change to the latest Society of Actuaries tables for mortality and projection of mortality improvements. However, we have issues with the application of steps #1-#4 in Segal's experience study.

***Benefit vs. Headcount-Weighted***

Our issues with steps #1 and #2 are related, and have to do with the fact that mortality studies in the U.S. have consistently shown that higher income individuals have longer life expectancies than lower income individuals. Because higher income individuals also typically have higher pension benefit amounts, especially with salary-related formulas, it is important for a pension plan to use assumptions that are weighted to reflect the impact on liability. Otherwise, the mortality assumptions could accurately predict the number of deaths at each age, but still underestimate the liabilities, if the higher-benefit members are outliving the lower-benefit members.

During 2017, the Society of Actuaries published "Credibility Educational Resource for Pension Actuaries: Application of Credibility Theory to Mortality Assumption" which includes discussion of the appropriateness of benefits- or amounts-weighted mortality tables versus counts-weighted tables. Section 3.4.3 of that publication states the following:

However, there are a number of reasons why ***using amounts-weighted ratios may be more appropriate for setting the mortality assumption for pension valuations:***

- Pension liabilities are amounts-weighted (i.e., individuals with higher benefit amounts contribute more to the pension liability than those with lower benefit amounts, all else being equal).
- Benefit amounts are often a predictor of mortality rates. Therefore, the estimate will be more accurate to the degree that the distribution of amounts is similar in the future.
- The standard mortality valuation tables (the relevant data that are available) are generally developed using amounts-weighting. Therefore, if the experience study does not use amounts-weighting, there may be inconsistencies in the development of the appropriate adjustment.

Consequently, an amounts-weighted actual-to-expected ratio better reflects liability development, may be more accurate and may be more consistent with the relevant data. For example, counts-weighted values may result in a mortality adjustment that leads to understated liabilities.

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Segal briefly mentioned the benefit-weighted approach in their experience study report, but then stated that the “headcount-weighted basis is the more common practice and is the approach used by Segal in the past for its California public system clients (including MCERA) and by other public sector actuaries in California.” Segal included no other justification in their report for using the Headcount-Weighted RP-2014 Tables as the standard mortality table upon which to base their recommendations (step #1 above), as opposed to the standard RP-2014 Tables, which are benefit-weighted. While the headcount-weighted approach may have been more common historically, we do not believe that is the case today.

The report published by the Retirement Plans Experience Committee (RPEC) that accompanied the release of the RP-2014 tables clearly states, “*For the measurement of most pension obligations, tables weighted by benefit amount generally produce the most appropriate results.*”

The report also describes a number of applications in which headcount-weighted tables may produce more accurate results, including estimates of average age at death, projections of retirement populations, and the measurement of OPEB plan obligations; the list of exceptions did not include the measurement of liabilities in traditional pay-related defined benefit plans.

One reason that RPEC recommends the use of the benefit-weighted tables for pension applications is that the behavior of the two tables are quite different: the mortality rates for the headcount-weighted tables are considerably higher at earlier ages, but gradually converge with the benefit-weighted rates at the highest ages. Using a headcount-weighted table will tend to overstate mortality rates in the early years of retirement, and understate it in later years, assuming the overall actual-to-expected ratio is close to 100% based on the number of deaths. Unless Segal has sufficient evidence to indicate that the pattern of mortality for MCERA looks closer to the headcount-weighted tables (measured on a liability-weighted basis), we believe the default should be to use a benefit-weighted table when a choice between such tables is available.

In addition to selecting the headcount-weighted RP-2014 tables as the standard table, Segal only reviewed the MCERA actual mortality experience on a headcount basis (step #2). We at Cheiron have made it a standard practice to at least review the mortality experience by both benefit amount and headcount in our studies for SACRS systems, and it is our understanding that the other actuarial consulting firm providing actuarial valuation services to non-Segal clients in the ’37 Act systems (Milliman) has also been reviewing the experience on both bases in their recent experience studies.

In our experience with most (but not all) of the SACRS plans and other public plans we work with in California, we have found a significant difference in the actual-to-expected ratios calculated on a headcount-weighted basis compared to a benefits-weighted basis, though the amount of the difference does vary between plans and employee populations. We note that in the experience study that Milliman recently completed for the Oregon Public Employee Retirement System (<http://www.oregon.gov/pers/Documents/2016-Exp-Study.pdf>), the difference between the benefit- and headcount-weighted actual-to-expected ratios averaged about 10% for both males/females and Miscellaneous/Safety members, which is consistent with the level we have found in some systems and represents a material difference.

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To estimate the potential impact of using a benefit-weighted versus headcount-weighted approach to mortality, we recalculated MCERA's liabilities using the RP-2014 benefit-weighted tables, with the same adjustments to the base tables and the 20-year static projection methodology reflected in Segal's June 30, 2017 valuation. This resulted in an increase in the Actuarial Accrued Liability of about 1.25%, and an increase in the overall contribution rate of approximately 1.3% of pay, compared to assumptions used in the June 30, 2017 actuarial valuation.

We note that this estimate does not reflect the actual differences between the benefit-weighted and headcount-weighted experience of MCERA, as Segal did not provide us with that information or include it in their experience study report. Instead, it represents the impact if the differences in the benefit-weighted versus headcount-weighted experience for MCERA were similar to the experience for the populations used to produce the base tables. Again, we strongly encourage Segal to examine the differences in benefit versus headcount-weighted experience for MCERA itself.

***Credibility***

Very few pension plans have sufficient experience to develop their own mortality tables. Most plans instead adjust a standard table (step #3). However, with approximately 1000 deaths necessary for full credibility (defined by a 90% probability that the observed rate is within 5% of the true rate) and actual mortality rates quite low at most ages, many plans lack sufficient data to perform even a full adjustment to a standard table (i.e., adjust the tables so the actual-to-expected ratio based on the plan's data is close or equal to 100%).

Segal's experience study report includes tables (page 27) that indicate the number of deaths included in the five-year study period. The total number of actual member deaths is well under 1000 at only 145, which includes beneficiary deaths. This experience would generally be considered on partially credible, and caution should be used in applying adjustments to the standard tables, including the one-year setback for male members and one-year set-forward for female members. Segal applied these adjustments to the RPH-2014 (Headcount-Weighted) Healthy Annuitant Mortality Tables.

Segal recommended similar adjustments to preretirement mortality to be consistent with postretirement mortality adjustments, but again we see no credible basis for adjusting the RPH-2014 (Headcount-Weighted) Employee Mortality Tables.

Similarly, we question the larger set-forward adjustments of 4 years (males) and 6 years (females) to the RPH-2014 (Headcount-Weighted) Healthy Annuitant Mortality Tables for disabled member mortality. Page 31 of the experience study shows only 24 actual deaths for disabled pensioners. If headcount-weighted tables are to be used, we recommend that Segal consider whether the RPH-2014 (Headcount-Weighted) Disabled Retiree Mortality Tables would be more appropriate than the significantly-adjusted healthy tables recommended in the report, based on the limited amount of disability mortality experience.

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*Static vs. Generational Mortality Improvement Projection*

To perform, step #4 – applying a projection scale to account for future mortality improvements – Segal has used an approach known as a static projection. Most actuaries (including Segal, for some of their other '37 Act clients) have begun recommending the use of an alternative approach, known as the “generational” approach to mortality improvement.

Segal has described the difference in these approaches in their experience study report, but for reasons that are not clear to us, they have recommended temporarily continuing the use of a static approach for MCERA, with the expectation that they would move towards a generational approach in a future study. In the report that accompanied the initial publishing of the mortality improvement scale MP-2014, the RPEC “encourages the application of Scale MP-2014 ... on a generational basis to all pension-related mortality tables, including those covering disabled lives.”

One reason to move away from static mortality projection is the reduced precision in using a fixed period of improvement for all ages and populations. A static projection is often calculated over a fixed number of years that approximates the duration of the liability being valued. While Segal’s recommendation of 20 years of static mortality improvement projection using scale MP-2016 is reasonable, since it produces a liability estimate that approximates the cost impact of using a full generational approach, it represents a simplification in that it applies the same amount of projected mortality improvement to all generations.

We have verified that the mortality rate “margin” of roughly 22% reflected in the static projections recommended by Segal does cover the liability impact that would result from moving to a generational projection. This confirms the result shown on page 26 of Segal’s report, wherein the cost impact of using a static approach with an increased margin was expected to be very similar to the use of a generational approach without an additional margin (1.8% vs. 1.9% of pay, respectively), given the same underlying base tables.

In summary for the mortality assumption, we recommend that Segal:

- Reconsider whether the RP-2014 Headcount-Weighted tables are the most appropriate to use as the basis of the MCERA-specific assumptions,
- Review whether an analysis of the MCERA actual experience on a benefit-weighted basis would have an impact on their recommended assumptions,
- Review whether the level of credibility assigned to the actual mortality experience of MCERA is appropriate, given the numbers of exposures and deaths, and
- Review whether a generational approach to mortality should be used.

We note that the mortality assumptions are of particular importance in the measurement of Plan liabilities, since they are used to determine both the member and employer rates, for both Legacy and PEPRA members. In our experience, it is likely that the use of a benefit-weighted derived mortality table and/or analyzing the mortality experience on a benefit-weighted basis will increase the Plan’s liabilities and as a result increase the Plan costs, if the pattern of MCERA mortality experience is similar to that of other plans.

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**Other Demographic Assumptions**

***Vacation Cash Outs***

In their experience study, Segal noted that non-PEPRA members may receive vacation cash outs at retirement that could be included in compensation as earnable, but have not historically been provided. We strongly support Segal’s recommendation to refine the cash out information they have been provided, and potentially apply a load to the benefits for non-PEPRA members, to account for the fact that the vacation cash outs for new retirees are likely to exceed the past cash outs that have been reported for these members in years prior to retirement.

We note that the prior actuarial audit of MCERA performed by EFI Actuaries included a comment that MCERA Staff had observed that these cash outs are generally not reported until the year just prior to retirement, and recommended that a load of 3.00% or 0.75% be applied to the service retirement benefits for members with 12- and 36-month final average compensation periods, respectively.

***Retirement Rates***

The current and proposed retirement rates included in Segal’s experience study are age-based, and Segal’s report reviewed MCERA’s experience on this basis. We generally recommend that the actuary review the experience on an age **and** service basis, as we frequently have found in the plans that we work with – including ’37 Act systems – that members of the same age but difference service levels will have different rates of retirement, with the more experienced individual being more likely to retire.

This discrepancy in the rates matters, because all other things being equal, the liabilities will be more heavily weighted towards those with higher levels of service (and thus higher benefits). If the retirement rates accurately predict the number of retirements by age, but overestimate the number of retirements for those with low levels of service and underestimate the number of retirements for those with high levels of service, it is likely that the assumptions will underestimate – potentially significantly – the future liabilities and costs of the Plan.

We performed a brief review of the retirement experience for MCERA on an age and service basis, using supplementary information provided by Segal. Our review of this information did not lead us to conclude that the current age-based assumptions are unreasonable, at least based on the recent experience. However, we recommend that Segal include an analysis of retirement behavior on an age and service basis in future experience studies.

**Economic Assumptions**

Overall, the economic assumptions proposed in Segal’s review represent a reasonable set of assumptions. In particular, we agree with Segal’s recommendation to reduce the assumed rate of price inflation from 3.25% to 3.00%, and to reduce the investment return assumption from 7.25% to 7.00%, reflecting a net real return of 4.00%.

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We have comments, however, on the “risk adjustment” that Segal used in developing their return recommendation, as well as several other aspects of the economic assumptions.

***Inflation***

We believe Segal’s recommended inflation assumption of 3.00% represents a reasonable long-term assumption. For MCERA, the inflation assumption is conservative in the sense that 3.00% represents the maximum benefit COLA, and actuarial standards allow for margins for adverse deviation. However, we note that the average inflation assumption for the investment consultants cited by Segal (2.3%), as well as the inflation forecasts used by Social Security (2.6%) and derived from 30-year Treasury bonds (2.1%) are all still significantly below the recommended rate.

We also note that 3.00% is 0.75% higher than the inflation reflected in the capital market assumptions provided by Callan, MCERA’s investment consultant. In making investment return recommendations, Segal adjusts the expected portfolio return by the difference between these two inflation assumptions. We recommend Segal carefully consider any distortions to capital market assumptions that may arise from the inflation discrepancy and resulting adjustments.

While we understand that large and sudden changes in long-term assumptions can be disruptive to the employers and members, and we acknowledge that a 3.00% inflation assumption still represents a reasonable long-term expectation given historical rates, we recommend that Segal and the Board continue to monitor this assumption and consider further reductions if market-based inflation expectations remain low.

***Risk Adjustment***

In their experience study report, Segal spends a significant amount of time discussing the concept of a “risk adjustment” – also referred to as a margin for adverse deviation. The following language is from their experience study report (page 12):

*in our model, the confidence level associated with a particular risk adjustment represents the likelihood that the actual average return would equal or exceed the assumed value over a 15-year period. For example, if we set our real rate of return assumption using a risk adjustment that produces a confidence level of 60%, then there would be a 60% chance (6 out of 10) that the average return over 15 years will be equal to or greater than the assumed value.*

Later in their report, they note that they anticipate a 0.40% offset to the investment return assumption to be a sufficient “risk adjustment” to provide a confidence level of 55%. However, this does **not** mean that there is a 55% chance of achieving the proposed return assumption of 7%, **when compounded over a 15-year period**. Average annual returns and average compound returns are different concepts, and the Board should focus on achieving an average compound return equal to or greater than the assumed rate of return.

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To illustrate the difference between these concepts, consider an extreme example: if your return is 100% one year (i.e., you doubled your money) and -100% the following year (i.e., you lost all your money), then the arithmetic average annual return is 0%, but the average compound return is -100% (i.e., you still don't have any money!). At the end of the day, most investors care about the geometric or compound rate. In the extreme example above, investors would gladly agree to hide their money under a mattress and earn nothing for two years, versus double their money and then lose it all the next year (but still earn the same arithmetic return!).

As stated above, Segal's "confidence level" model provided MCERA with the likelihood that the arithmetic average investment return will exceed the assumption over a 15-year period. However, the likelihood that the geometric or compound average return will exceed the assumption is considerably less. In fact, rather than a 55% chance, there is roughly a 45% chance that the compound return will equal or exceed 7.00%, based on the inflation, real return and expense adjustments provided by Segal in the table on page 14 of their report.

The expected return would need to be lowered to around 6.75% to obtain a 50/50 confidence level, and lowered all the way down to 6.25% to achieve a 55% confidence level on a compound basis. In a follow-up email to us, Segal acknowledged this issue, stating that Callan's expected geometric return for the portfolio is currently 6.4%, which when adjusted for the difference in the inflation assumption between the investment consultant and the Plan (2.25% vs. 3.00%) and for an administrative expenses adjustment of 0.25% (with no adjustment for investment expenses), would result in a 6.90% net return, which is below the 7.00% assumption, implying less than a 50% chance of achieving the return on a compound basis. We appreciate Segal sending this information, but we suggest it should be shared with the Board and discussed as part of the experience study.

***Merit and Promotional Pay Increases***

Segal recommended no changes to the merit and promotional increases component of salary growth assumptions for members with less than five years or more than 10 years of service, in spite of higher reported increases in these categories during the past three years. However, similar experience was noted by Segal as part of the prior experience study, and higher rates of merit promotional increases at high service levels – at least for Safety and Probation members – were also noted as part of the last actuarial audit performed by EFI Actuaries in 2011.

Rather than dismissing the observed experience of the Plan, we recommend Segal closely review the salary experience with Staff to determine whether higher ultimate merit and promotional increases are warranted.

***Reciprocal Pay Increases***

Segal recommends lowering the annual pay increase assumption for reciprocal members from 4.25% to 4.00%. This 0.25% decrease is in line with the decrease in assumed inflation, but we do not see any supporting information for this assumption in the experience study report.

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**Actuarial Methods**

Actuarial methods relate to the application of actuarial assumptions in the determination of Plan liabilities and contributions. These methods include the actuarial cost method, amortization policy, actuarial asset smoothing, and cost-sharing methodologies. The questions guiding our review of the actuarial methods were the following:

- Are the methods acceptable and appropriate for the intended purpose?
- Do the methods comply with relevant accounting and actuarial standards?

**Actuarial Cost Method**

The individual Entry Age actuarial cost method is used in the June 30, 2017 actuarial valuation. Under this method, the expected cost of benefits for each individual member is allocated over that member's career as a level percentage of that member's expected salary. The normal cost for the plan is the sum of the individual normal costs calculated for each member. We concur with this methodology and note that it is a "Model Practice" based on the guidance issued by the California Actuarial Advisory Panel (CAAP), and a "Best Practice" based on guidance issued by the Government Finance Officers Association. Segal has also applied this method in a manner which complies with the disclosure requirements under GASB Statements 67 and 68.

**Asset Smoothing Method**

The Actuarial (or smoothed) Value of Assets is determined using a five-year period for gains and losses, and is restricted to fall within 75% to 125% of the market value of assets. We have confirmed that the Segal report applies the actuarial smoothing method as described.

In our opinion, this method satisfies the Actuarial Standard of Practice which governs asset valuation methods (ASOP No. 44), which requires that the actuarial asset value should fall within a "reasonable range around the corresponding market value" and that differences between the actuarial and the market value should be "recognized within a reasonable period of time."

We commend Segal for including the funded ratio and unfunded liability using both the market value and smoothed value of assets in their report. These disclosures are included in the "Model Disclosure Elements for Actuarial Valuation Reports" adopted by the CAAP.

**Amortization Policy**

The current Amortization Policy for MCERA is a layered amortization policy, with the balance of the unfunded liability as of June 30, 2012 amortized as a level percentage of payroll over a closed 27-year period (22 years remaining as of June 30, 2017). Each subsequent year's unfunded liability attributable to experience gains or losses, assumption changes, and cost method changes is amortized as a level percentage of payroll over a new closed 18-year period. Plan amendments are amortized over closed 15-year periods and early retirement incentive programs will be amortized over five years.

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We have confirmed that the Segal report applies the amortization method as described. This amortization method is in accordance with the recent funding policy guidance issued by the CAAP, GFOA, and the Conference of Consulting Actuaries Public Plans Community. This amortization policy also meets the minimum standards of the '37 Act.

**Contents of the Reports**

We find the actuarial valuation and experience study reports to be in compliance with Actuarial Standards of Practice. We have already mentioned areas in which we believe the experience study report could be enhanced – such as clarifying the risk adjustment factor in the experience study report.

We also encourage Segal to consider whether a demonstration of future expected funding progress and contribution rates and/or additional statements regarding risk should be contained within the actuarial valuation report. This report represents to the public the current financial condition of MCERA, and as such, we recommend it include a prospective view. We believe that a longer projection can also be helpful to the Board, and we typically include such projections as part of our actuarial valuation reports.

With respect to risk, although Segal does briefly describe some common volatility ratios in the Section 2 of their report, there is no mention of these ratios or any other discussion of volatility in the Executive Summary. Also, there is no discussion regarding positive or negative cash flow and the risks associated with these situations. We note that the Actuarial Standards Board has recently released a new Standard of Practice related to the disclosure of risk for pension plans, the content of which may be useful to Segal and the Board in assessing whether additional risk disclosures could add value to the valuation report.

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**APPENDIX A – GLOSSARY OF TERMS**

**1. Actuarial Assumptions**

Estimates of future experience with respect to rates of mortality, disability, turnover, retirement, investment income, and salary increases. Demographic assumptions (rates of mortality, disability, turnover, and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

**2. Actuarial Gain (Loss)**

The difference between actual experience and actuarial assumption anticipated experience during the period between two actuarial valuation dates, as determined in accordance with a particular actuarial funding method.

**3. Actuarial Liability**

The Actuarial Liability is the present value of all benefits accrued as of the valuation date using the methods and assumptions of the valuation. It is also referred to by some actuaries as the “accrued liability” or “actuarial accrued liability.”

**4. Actuarial Present Value**

The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest, and by probabilities of payment.

**5. Actuarial Value of Assets**

The Actuarial Value of Assets equals the Market Value of Assets adjusted according to the smoothing method. The smoothing method is intended to smooth out the short-term volatility of investment returns in order to stabilize contribution rates and the funded status.

**6. Actuarial Cost Method**

A mathematical budgeting procedure for allocating the dollar amount of the “actuarial present value of future plan benefits” between the actuarial present value of future normal costs and the Actuarial Liability. It is sometimes referred to as the “actuarial funding method.”

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**7. Funded Status**

The Actuarial Value of Assets divided by the Actuarial Liability. The Funded Status can also be calculated using the Market Value of Assets.

**8. Governmental Accounting Standards Board**

The Governmental Accounting Standards Board (GASB) defines the accounting and financial reporting requirements for governmental entities. GASB Statement No. 67 defines the plan accounting and financial reporting for governmental pension plans, and GASB Statement No. 68 defines the employer accounting and financial reporting for participating in a governmental pension plan.

**9. Market Value of Assets**

The fair value of the Plan's assets assuming that all holdings are liquidated on the measurement date.

**10. Normal Cost**

The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. It is sometimes referred to as "current service cost." Any payment toward the unfunded actuarial liability is not part of the normal cost.

**11. Present Value of Future Benefits**

The estimated amount of assets needed today to pay for all benefits promised in the future to current members of the Plan, assuming all Actuarial Assumptions are met.

**12. Present Value of Future Normal Costs**

The Actuarial Present Value of retirement system benefits allocated to future years of service.

**13. Unfunded Actuarial Liability (UAL)**

The difference between the Actuarial Liability and the Actuarial Value of Assets. This is sometimes referred to as the "unfunded accrued liability."



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