CalPERS Experience Study
and Review of Actuarial Assumptions

CalPERS Actuarial Office

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Executive Summary

The purpose of this experience study was to review actual experience of the system in relation to the current actuarial assumptions, and to recommend changes in actuarial assumptions for the rates of decrement, salary increase rates and economic assumptions, as may be indicated by the review.

The report presents the results of the experience study of the California Public Employees Retirement System. The report is derived from data collected during fiscal years 1997 to 2011. It has been over three years since the last study which was completed in April 2010 and reflected the experience between 1997 and 2007. This study reviewed retirement rates (service, work related disability and non-work related disability retirement), termination rates[*] (vested terminations and refunds), mortality rates (pre- and post-retirement) and rates of salary increase (increases of salary in excess of inflation) and recommends new assumptions for use in actuarial valuations of plans that participate in the California Public Employees Retirement Fund (State, schools and public agencies).

The recommended assumptions predict:

- Longer post-retirement life expectancy. The life expectancy of males is increasing by about 2.1 years while it is increasing by about 1.6 years for females.
- Earlier retirement ages for the State CHP, POFF and local Police and CPO members, slightly earlier retirement ages for State Miscellaneous and Safety, no changes for the State Industrial or the Schools pool and mixed results for local agency miscellaneous members.
- Higher salary increases for members with high service.
- Mixed results for other assumptions (these are described in detail in this report).

[*] In this report "termination rates" mean a cessation of participation in the system

Introduction

The purpose of this experience study was to review the actual experience of the system in relation to the current actuarial assumptions, and to recommend changes to the actuarial assumptions for rates of decrement, salary increase and economic factors as may be indicated by such a review. The report has been prepared in accordance with current board policy which requires that an actuarial experience study be performed every four years. The report presents findings of demographic assumptions of the plans that participate in the California Public Employees Retirement Fund (State, Schools and Public Agencies) for the 14 year period from 1997 to 2011. The results have been reviewed by CalPERS staff, and are presented in this report.

Background

An experience study is a summarization of actual experience over a defined period of time. A study can be on past economic experience (such as past inflation, real rates of return on various asset classes, real salary growth relative to inflation, and payroll growth of the active population) and/or on past demographic experience (with an analysis of recent patterns of termination, death, disability, and retirement).

This study includes all the experience of the system for both demographic and economic experience. We consider the advancement of salaries due to seniority, merit, and promotion, independent of inflation as demographic experience for the purposes of this study.

Actuaries use the term “decrement” to describe the circumstances under which individuals leave a population under study. For example, an individual may decrement from the group of active members of the plan due to termination (vested or non-vested), death (work related or not), disability (work related or not), or service retirement. “Exposure” is the term used by actuaries to represent the length of time that an individual was exposed to the possibility of leaving the population due to the decrement being studied.

We first compute the raw rates of decrement and salary increases. The raw rate of decrement (for a given decrement and studied population) is defined as the total number of individuals that left the population due to that decrement divided by the total exposure to that decrement for the group. The raw rate of salary increase for a given group is the observed percentage change in salaries for the group from one year to the next. The rates are functions calculated by a series of factors such as age and/or length of service. They do not necessarily become new actuarial assumptions about patterns of behavior for the future for two major reasons. First, the raw rates may represent only a sample of what might be a smooth underlying formula that really predicts behavior; an actuary frequently will “smooth” or “graduate” the raw rates to approximate the smoother underlying formula. Second, and more importantly, the future does not necessarily repeat the past; the experience study must be combined with a considerable amount of actuarial judgment to produce the actuarial assumptions used to anticipate future behavior.

Purpose of the Report

The purpose of this experience study is to review the actual experience of the system against the current assumptions and to recommend new actuarial rates of decrement, salary increase (in excess of inflation) and economic assumptions based on that experience.

Scope of the Study

This study focused on demographic experience and economic assumptions. The study reviewed retirement rates (service, work related disability and non-work related disability retirement), termination rates (vested terminations and refunds), mortality rates (pre- and post-retirement) and rates of salary increase (increases of salary in excess of inflation). The study does not investigate other demographic assumptions such as the proportion of members who are married, the age difference between a member and his/her spouse, the amount of unused sick leave or the load to account for the use of “best factors”.

In general, salary increases are awarded to employees due to economic factors (price inflation and real wage growth) and factors specific to particular employees (increases due to seniority, merit and promotion). This study examined the factors specific to particular employees and factors relating to price and wage inflation, payroll growth (specifically to risk pools at CalPERS) and the discount rate. The changes recommended in this report are to be combined with the economic assumptions about price inflation and real wage growth to determine the final salary increase assumption used in actuarial valuations.

Demographic Experience Methodology

The methodology used in this study was the same as the methodology used in the 2004 and 2010 experience studies. An experience study methodology report, developed and reviewed by the actuarial consulting firm of EFI Actuaries Inc. in 2003, was followed when performing the 2004 experience study. The results of the 2010 study were audited by Gabriel Roeder Smith & Co. in 2010.

A general discussion of the methodology used follows. Additional details about the methods used are included in the description of the findings for each decrement.

Data Source

The source of the data used in this study was the data stored in the actuarial valuation system. This data consists of a series of snapshots of the member data taken as of the end of each fiscal year.

The data for the experience study was extracted from the actuarial database in the form of fourteen annual snapshots as of June 30th of the years 1997 to 2011. The data represents the participants in all of the retirement plans included in the California Public Employees Retirement System.

These consecutive snapshots were used to generate four main files, one for active members, one for retired members, one for beneficiaries and one for the inactive members. Each individual member is tracked from the time he or she enters the study. Those who exit are assigned an exit reason.

Calculation of Exposures and Assignment of Decrements

In general, an individual's exposure to a particular decrement begins only after that individual is eligible to receive benefits should that decrement occur. To reflect this, the exposure of each individual in the study commenced at either the study start date or the eligibility date, whichever was later. Similarly, exposure ended at the study end date or the date at which the eligibility ceased, whichever was earlier. We excluded individuals who decremented before the study start date or were not eligible to receive a benefit by the study end date. The Balducci hypothesis was applied, so if the decrement under study occurred during the observation period, exposure continued to the end of the age and/or service interval in which the decrement occurred.

The calculation of exposures, decrements and rates was applied consistently for all assumptions and was consistent with the method used by the actuarial valuation software. The decrement timing used for age was age nearest birthday on decrement date and the decrement timing used for service was service nearest whole year on decrement date, again consistent with the method used by the actuarial valuation software.

Rates Studied

As was specified in the methodology report, the following demographic assumptions were studied.

Retirement Rates

- Service Retirement
- Work Related (Industrial) Disability Retirement
- Non-work Related Disability Retirement

Mortality Rates

- Pre-retirement Mortality – Ordinary
- Pre-retirement Mortality – Industrial
- Post-retirement Mortality – Service Retiree
- Post-retirement Mortality – Non-work Related Disability Retiree
- Post-retirement Mortality – Work Related (Industrial) Disability Retiree

Termination Rates

- Termination (with and without refund)

Non-Decrement Rates

- Salary Increases (due to factors other than wage inflation)

Grouping Factors

Actuarial assumptions are based on a number of factors, including, but not limited to age, gender, and service. For each decrement, different factors were examined for possible use in setting actuarial assumptions. The decision as to which factor was used was based on CalPERS actuaries' professional judgment.

The factors that were examined are documented in the methodology report. Possible factors included:

- Age nearest birthday on decrement date. Service nearest whole year on decrement date.
- Entry Age (Computed as Attained Age - Service)
- Age at Retirement
- Gender
- Retirement Formula
- Organization Category (State, Schools, or Public Agency)
- Membership Category (e.g., Miscellaneous, Industrial, Firefighter, Police)

- Employer Type (City, County, or Other)

Note that with the passage of Senate Bill 400 in 1999, State Miscellaneous and State Industrial Tier 2 members were given the right to convert their service to Tier 1 any time prior to retirement. As a result, the number of members being covered under these two plans continues to decrease year after year. Therefore, only Tier 1 assumptions were derived as part of this experience study and Tier 2 assumptions will remain unchanged.

Graduation

Various methodologies were used to graduate the results depending on the decrement and the amount of data available ranging a modified Whittaker-Henderson graduation formula to a simple linear fit to manual adjustment. Details are discussed in the sections dealing with the individual decrements and in the section dealing with the salary scale.

Margins

A margin is the difference between the assumption used for a calculation and the corresponding best estimate assumption. The actuarial assumptions recommended in this report represent our best estimate of future experience with no margins for adverse deviation except for pre and post-retirement mortality. For these decrements, a margin, based on the published improvement scale BB, has been subtracted from the mortality rates for service retirees and beneficiaries to account for on-going improvements in mortality. More details can be found under the findings for the pre and post-retirement mortality.

Analysis

The analysis of the demographic experience for this study involved the following steps:

1. First, the number of decrements and exposures for the decrement under study were calculated and tabulated.
2. Next, the number of members expected to decrement was calculated by multiplying the exposures by the expected rates of decrement (current assumptions).
3. Finally, the number of actual decrements was compared with the number of expected decrements over a given period. The comparison which was expressed as a percentage is called the actual to expected ratio (A/E Ratio).

If the actual experience, based on the A/E ratio's differed significantly from the overall expected results, whether by the pattern based on graphs, or whether the crude probability rates versus current assumptions differed significantly, then new assumptions were considered, otherwise, no changes to current rates was recommended.

The findings for each decrement are presented in the tables in the following sections.

Findings

Service Retirement for Active Members

Summary

The experience over the study period shows that, in general, more members are retiring than would be predicted by the current retirement assumptions for most of the State plans, and local safety plans. Local agency miscellaneous plans are showing mixed results with the lower level formulas showing lesser than expected numbers of retirements while the higher level formulas showing more than expected.

We are recommending revising the age and service based retirement assumptions for most of the plans which will result in future expected numbers of retirements that closely match the actual numbers of retirements during the experience study period specific to each benefit formula. No changes in assumptions are being proposed for State Industrial and the Schools pool. For the following benefit formulas or member classifications the proposed assumptions predict lower number of expected retirements as compared with the current assumptions:

- Local miscellaneous members under the 2% at age 60, 2% at age 55 and 2.5% at age 55 formulas,
- Local firefighter members under the 3% at age 50 formula and local police under the 3% at 55 formula.

For the following benefit formulas or member classifications the proposed assumptions predict higher number of expected retirements as compared with the current assumptions:

- State plans CHP, POFF, Safety and Miscellaneous,
- Local miscellaneous members under the 2.7% at age 55 and 3% at age 60 formulas,
- All formulas under local police members except the 3% at 55 formula,
- Local firefighter members under the 3% at age 55 and 2% at 50 formula.

All current and proposed assumptions are all based on age and service. The age and service based retirement assumptions allow for better recognition of the costs.

Method

The retirement rates were based on data collected between June 30, 1997 to June 30, 2011. For the State plans and the Schools pool, only the data between June 30, 2000 and June 30, 2011 was included in the study since the retirement formula for all these groups was changed

effective January 1, 2000 as a result of SB 400. For the 2.5% at age 55, 2.7% at age 55 and 3% at age 60 formula for local agency miscellaneous members, only the data between June 30, 2002 and June 30, 2011 was included since these benefits became effective on January 1, 2002.

Active and terminated members' retirement experience was studied separately. Transferred members records were excluded to prevent potential double counting of exposures and decrements. The proportion of transferred members who do not have an active record elsewhere in the system is so small that excluding such members will not compromise the results of the study. Since most transferred members are also active members with another CalPERS employer, the active retirement rates will be applied to the transferred members.

We also attempted to exclude any experience in the periods before and after an agency experienced an increase in their retirement formula. Experience has shown that members delay retirement from the year before the change in the retirement formula to the year after the improvement. Therefore any data from these two years was excluded from the study.

Factors used for grouping data:

- Age: The retirement rates display a strong pattern by age, due to influences such as the variance in benefit by age, traditional retirement ages, and eligibility for Social Security.
- Service: Retirement rates increase with service.
- Retirement Formula.
- Organization Category.
- Membership Category: Separate retirement rates were developed for miscellaneous members, police and firefighters.
- Employment status: active and terminated were studied separately

Factors studied but not used for grouping data:

Gender: The data indicated there is difference in service retirement rates for males and females employees. There was also indications that rates varied by length of service. However, there is not sufficient credible experience to produce male/female specific service retirement rates or age/service rate tables.

County peace officers were studied separately again this in study as in the last and since the results were close to the results for police there is no reason to discern between the two groups.

The data was first grouped by membership category and benefit formula. In order to assess whether or not the current assumptions had to be revised, we did a comparison of the actual number of retirements to the expected number of retirements anticipated by our current assumptions. The expected number of retirements was compared to the actual number of retirements (A/E ratio) for all ages and for all services. Based on this comparison changes to the current assumptions were made where appropriate using

adjustments to current retirement probabilities to achieve overall and age specific (i.e. each and every age) actual to expect retirement ratios to as close as possible to 100%.

Some public agencies may have mandatory retirement policies at certain ages for safety members. No data was available about these policies and it was not possible to identify or exclude the impact of these policies in this study. However, such policies would have affected the results.

Results

The service retirement rates display a strong and fairly consistent pattern by age. This can be attributed to a combination of the psychology of the membership and the structure of the benefits. It has long been observed that members tend to display a preference for retiring at ages divisible by 5, thus, retirement rates tend to be higher at ages 50 55, and 60 or at the age when the benefit factors no longer increase. After age 55 the 2.5% at age 55 and 2.7% at age 55 benefit factors no longer increase. After age 60 the 3% at age 60 benefit factor no longer increases. In addition, retirement rates are also higher at age 62 (when social security becomes available).

State and Schools Pool

In 1999, Senate Bill 400 was enacted and provided enhanced retirement benefits to all State and School employees. Therefore, in the previous and current studies, only data after year 2000 was considered since the benefit enhancements became effective on January 1, 2000.

The retirement rates were also studied by fiscal year to try to isolate the impact certain events might have had on the retirement behavior.

In the plans where no changes were recommended, the Schools pool had actual numbers of retirements that were not significantly at variance with the expected number of retirements overall and at each retirement age over the study period. For the State Industrial plan the number of retirement observations overall was low and the actual number of retirements over the study period was relatively close to expected. Therefore no changes in assumptions are being proposed for either the State Industrial plan or the Schools pool plan.

Both State Miscellaneous and State Safety show the actual number of service retirements has increased slightly more than expected over the study period. Since the number of actual recorded observations versus expected varied mostly by age, the retirement assumptions were adjusted to minimize variance by age and to achieve overall actual to expected ratio close to a 100%.

State CHP and POFF show the number of service retirement increased significantly more than expected overall and also the actual to expected ratio varied significantly at most ages. For CHP, the current assumptions predicted 797 expected retirements over the period since SB400 was enacted, the actual number of retirements was 1,784. The active member distribution shows that this continued high number of retirements can be expected to continue. The

proposed assumptions have been recalibrated to match both overall expected retirements and number of retirements by age to as close as possible to a 100% actual to expected ratio. The situation is similar for POFF however not to the magnitude that CHP experienced. The current expected assumptions had only predicted slightly over 9,000 retirements for POFF while the actual count of retirements was over 12,000. The POFF proposed assumptions have also been recalibrated to match both overall expected retirements and number of retirements by age as close to a 100% actual to expected ratio.

Local Agencies

For members subject to the local miscellaneous 3% at age 60 formula, the proposed new assumptions predict overall fewer retirements for members under age 59 and more retirements for members over age 59. The proposed assumptions have been adjusted to reflect higher retirements above age 59.

For local miscellaneous 2% at age 60, 2% at age 55 and 2.5% at age 55 formulas, the proposed assumptions have been adjusted to predict around 7 to10% fewer retirements than expected under the current assumption over each formulas' respective study period.

For local safety firefighter 3% at age 50 and police 3% at age 55, the proposed assumptions have been adjusted to predict around 5 to12% fewer retirements than the expected under the current assumptions. For all other local safety plans results have shown that the actual number of service retirements has increased more than expected by around 5%. The proposed assumptions have been adjusted to predict more retirements than are expected from the current assumptions.

The table below compares the actual number of retirements due to service retirement with the expected number of such retirements under both the current and proposed assumptions for active members by plan for the State plans and by benefit formula for local agencies.

Service Retirement Rates for Active Members					
	Actual*	**Expected (Current)**	**A/E Ratio**	**Expected (Proposed)**	**A/E Ratio**
State Miscellaneous	55,664	53,696	103.7%	55,550	100.2%
State Industrial	2,659	2,571	103.4%	No Changes	
State Safety	6,763	6,448	104.9%	6,706	100.9%
POFF	12,037	9,156	131.5%	11,995	100.3%
CHP	1,784	797	223.9%	1,790	99.7%

* The number of actual and expected retirements has been adjusted to exclude all retirements on and above the age at which 100% of members are assumed to retire.

Schools	74,910	75,139	99.7%	No Changes	
Public Agency					
2% at age 60 Miscellaneous	3,501	3,905	89.6%	3,513	99.7%
2% at age 55 Miscellaneous	31,477	33,847	93.0%	30,867	102.0%
2.5% at age 55 Miscellaneous	6,929	7,449	93.0%	6,940	99.8%
2.7% at age 55 Miscellaneous	9,856	9,785	100.7%	9,832	100.2%
3.0% at age 60 Miscellaneous	5,228	5,020	104.1%	5,135	101.8%
2% at age 50 Firefighters	743	708	104.9%	741	100.3%
3% at age 55 Firefighters	602	586	102.7%	608	99.0%
3% at age 50 Firefighters	2,225	2,506	88.8%	2,231	99.7%
2% at age 50 Police	903	836	108.0%	901	100.2%
3% at age 55 Police	297	314	94.5%	297	99.9%
3% at age 50 Police	3,795	3,628	104.6%	3,763	100.8%

Service Retirement for Terminated Members

Summary

In the previous experience study, the retirement pattern of terminated members was studied for the first time. The findings indicated that the retirement pattern for terminated members was similar to the retirement pattern of the active members. As a result, in setting the retirement rates for the terminated members, a set of load factors was recommended and adopted to be applied to the retirement rates of the active members.

In the CalPERS valuation system, terminated members are currently assumed to retire as soon as they are eligible with an overall load factor that does not vary by membership category. We reviewed this assumption and are proposing the adoption of the two sets of load factors, one for miscellaneous members and one for safety members, to be applied to the retirement rates that vary by age and service for active members.

Method

The retirement rates were based on data collected between June 30, 1997 to June 30, 2011. For the State plans and the Schools pool, only the data between June 30, 2000 and June 30, 2011 was included in the study since the retirement formulas for all these groups were changed effective January 1, 2000 as a result of SB 400.

Employment status: active and terminated were studied separately

Factors used for grouping data:

- Age: The retirement rates display a strong pattern by age, due to influences such as the variance in benefit by age, traditional retirement ages, and eligibility for Social Security.
- Service: Retirement rates increase with service.
- Retirement Formula
- Organization Category
- Membership Category: Separate retirement rates loads were developed for miscellaneous and safety members.

Gender was not used for grouping data.

Results

In this experience study, the retirement pattern of terminated members has been studied. For terminated members we observed that the service retirement rates display a strong and fairly consistent pattern by age. The results continue to show that terminated members retired much faster than active members at younger ages and much slower at higher ages.

By comparing the retirement pattern for terminated members to the retirement pattern of active members, it became clear that they were similar. The miscellaneous and safety members showed similar retirement patterns but at different ages due to different benefit formulas. As a result, the recommendation is to continue to use the same retirement pattern approved for active members but apply the load factors separately by miscellaneous and safety, to reflect the different retirement patterns between the two membership categories.

Below is a table showing the recommended load factors.

	Current Load Factors	**Proposed Load Factors**	
Age	**All Plans**	**Miscellaneous Plans**	**Safety Plans**
50	450%	190%	310%
51	250%	110%	190%
52	200%	110%	105%
53 through 54	200%	100%	105%
55	200%	100%	140%
56 and above	200% Graduating to 100% at age 65	100%	100%

The table below compares the actual number of retirements due to service retirement for terminated members with the expected number of such retirements under both the current and proposed assumptions for terminated members. The table below shows that the actual to expected ratio is not close to 100%. This is due to the application of the load factors (set at least 100% of active rates) on the exposures. We have applied the load factors to 100% of the actual active retirement rates at higher ages to ensure that the terminated statuses will decrement to retired status at some future time in the valuations as actual terminated retire rates are well below active rates above age 55. It is clear that by delaying the pension payments the member is losing value, however, by loading the rates to 100% of the active rates an element of conservatism is realized.

Service Retirement Rates for Terminated Members					
	Actual	**Expected (Current)**	**A/E Ratio**	**Expected (Proposed)**	**A/E Ratio**
State					
State Miscellaneous Tier 1	4,375	15,002	29%	11,006	40%
State Industrial Tier 1	250	1,125	22%	839	30%
State Safety	439	1,282	34%	954	46%
POFF	317	777	41%	768	41%
CHP	43	37	115%	64	67%
Schools	8,443	37,175	23%	26,509	32%
Public Agency					
Miscellaneous	8,458	26,129	32%	16,318	52%
Safety	1016	2,739	37%	1,797	57%

Non-Work Related Disability

Summary

Where applicable, the proposed rates produce lower numbers of disability. No changes in assumptions are being proposed for any State or Public Agency safety plans or for State Industrial. New rates are being proposed for Schools, State Miscellaneous and Public Agency miscellaneous members. The proposed rates are lower for nearly all groups. However, the rates are slightly higher above the age of 50 for Schools female members and State Miscellaneous males.

Method

The decrement study reviewed the non-work related disability (ODR) experience over the 14 year period 1997 to 2011. The last decrement study was performed four years ago covering experience from 1997 to 2007. During the period following the last decrement study, that is, the period 2007 to 2011, there was a noticeable reduction in the incidence of ODR for all employee categories. This 4 year period was deemed too short to establish a permanent shift in ODR rates and to be fully reflected in the proposed rates. Where changes have been recommended, the proposed rates were derived using the results of 10 years of experience from 2001 to 2011.

Transferred members were excluded from the study of this decrement for the same reasons as in the study of the service retirement decrement.

Factors used for grouping data:

- Age: Rates displayed a strong and fairly consistent pattern by age.
- Gender: For some groups, male and female disability rates differed significantly and separate tables were produced. For other groups, the male and female rates did not differ materially, or there was insufficient data to determine if rates were materially different, and the results were combined.
- Organization Category:
- Membership Category: There are substantial differences in the disability rates by membership category.

Raw non-work related disability retirement rates were graduated using the Whittaker-Henderson method, with moderate additional smoothing in some cases.

Results

No changes in assumptions are being proposed for any State or Public Agency safety plan or for the State Industrial Plan. New rates are being proposed for Schools, State Miscellaneous and Public Agency miscellaneous members. The overall rates are lower for all groups with new rates. However, the rates are slightly higher above the age of 50 for Schools female members and State Miscellaneous males.

In Schools, males had higher disability rates; in State Miscellaneous, females had higher disability rates; in Public Agency miscellaneous, disability rates were slightly higher for males. These results are consistent with the results from the previous experience study.

For miscellaneous groups, disability rates at high ages (60 and above) are lower than the rates at initial retirement ages (50 to 55). This pattern was observed in multiple groups where substantial portions of the active population work beyond age 60 (e.g. State Miscellaneous, Public Agency miscellaneous, and Schools pool). We believe that an explanation for this effect could be that, beyond age 55, the service retirement benefit is greater than the disability benefit, which encourages people to choose service retirement.

The table below compares actual number of non-work related disability retirements with expected number of such retirements under both the current and proposed assumptions. The counts are for 1997-2011 if there is no change and for 2001-2011 if there is a change.

Non-Work Related Disability Retirements					
	Actual	**Expected (Current)**	**A/E Ratio**	**Expected (Proposed)**	**A/E Ratio**
State					
Miscellaneous Tier 1 Male	971	1,332	73%	975	100%
Miscellaneous Tier 1 Female	1,872	2,435	77%	1,867	100%
Industrial	354	379	93%	No Changes	
Safety	409	366	112%	No Changes	
POFF	312	282	111%	No Changes	
CHP	15	16	92%	No Changes	
Schools					
Schools Male	1,387	1,654	84%	1,392	100%
Schools Female	2,102	2,745	77%	2,102	100%
Public Agency					
Miscellaneous Male	1,168	1,782	66%	1,182	99%
Miscellaneous Female	1,139	1,556	73%	1,139	100%
Firefighters	53	52	102%	No Changes	
Police	128	120	107%	No Changes	

CPO	102	85	120%	No Changes

Work-Related (Industrial) Disability Retirement

Summary

The proposed Industrial Disability Retirement (IDR) rates are lower than the previous rates for all employee categories, except for State Industrial employees where the rates not being adjusted.

Method

The decrement study reviewed the IDR experience over the 14 year period 1997 to 2011. The last decrement study was performed about three years ago covering experience from 1997 to 2007. During the period following the last decrement study, that is, the period 2007 to 2011, there was a noticeable reduction in the incidence of IDR for all employee categories. This 4 year period was deemed too short as to establish a permanent shift in IDR rates and to be fully reflected in the proposed rates. The proposed rates were however derived based on the 11 years of experience from 2000 to 2011. The previous study used a ten year period.

Transferred and terminated members were excluded from the study for the same reasons listed in the study of the service retirement decrement.

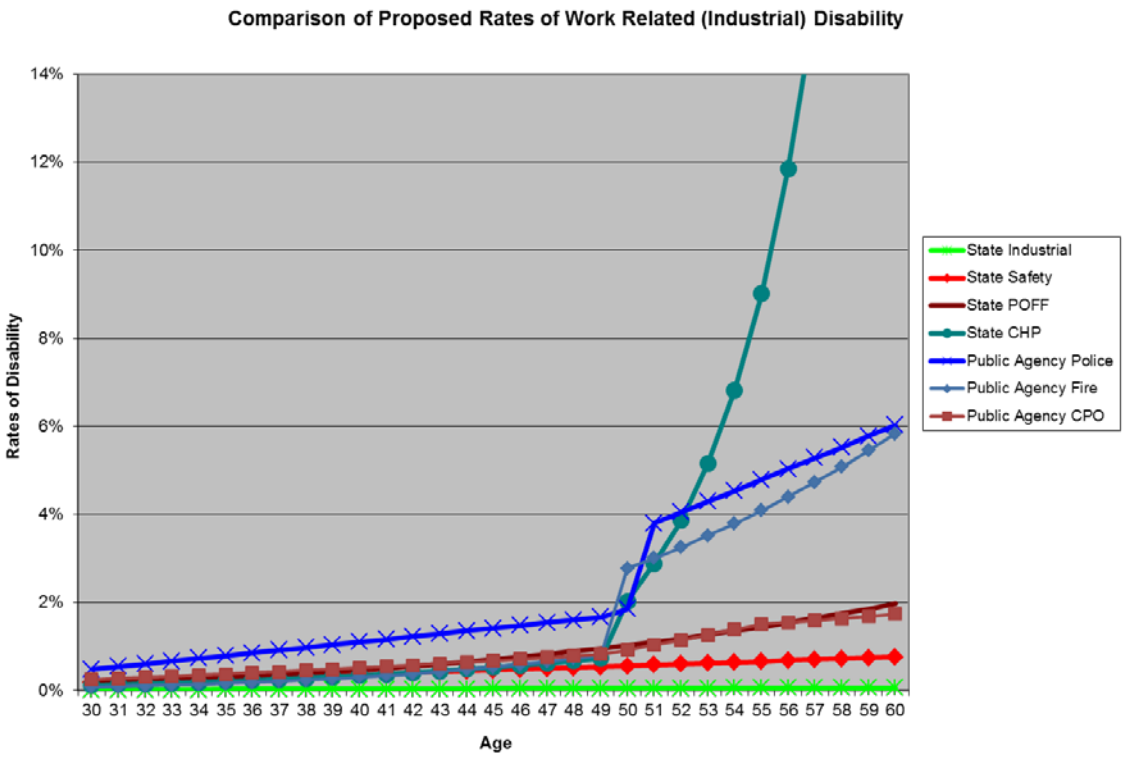
Factors used for grouping data:

- Age: Rates increase with age. There were very few decrements below age 30 while some groups had very high IDR rates close to or at service retirement eligibility ages.
- Employee category: The IDR rates differed by employee category. Therefore separate rates were developed for State Industrial, State Safety, State POFF, State CHP, Public Agency Firefighters, Public Agency Police and Public Agency CPO members.

The data indicated there is difference in IDR rates for male and female members. There was also indications that rates varied by length of service. However, there is not sufficient credible experience to produce male/female specific IDR rates on age and service.

Discussion

There are significant variations in the patterns of work related disability between the various membership categories. It is believed that these differences represent real underlying differences in the behavior of members. For example, three of the groups (Public Agency police, Public Agency firefighter and California Highway Patrol) show a very substantial increase in the rates of industrial disability at or shortly after age 50. Three other groups (State Safety, State POFF and Public Agency CPO's) do not display this effect. This difference is believed to be due to how strictly the disability criteria are enforced for the different groups.



One group (State industrial) has much lower IDR rates at all ages than the other groups. This is believed to reflect a difference in the nature of the work performed by this group as compared to the nature of the work performed by the other groups.

Results

The new IDR rates are lower for all employee categories except for Industrial State members.

The basic IDR benefit is 50% of final compensation plus an annuity purchased pursuant to statute. If the employee is eligible for service retirement, the service retirement benefit is payable if greater. The rates of IDR are highest over age 50. As many members are eligible for service retirement at this age, they receive the larger service retirement pension in the event of IDR. IDR's at these higher ages has minimal impact on pension costs. However, the preferable tax treatment of IDR benefits does result in additional costs to taxpayers.

Pension Reform, effective January 1, 2013, added a provision for safety members who qualify for IDR under age 50. In some circumstances, an IDR pension larger than 50% of final compensation may be payable at ages less than 50. IDR experience will be monitored to see if the change in legislation has any impact on reporting of IDR events.

The table below compares the actual number of decrements due to work related disability retirement with the expected number of such decrements under both the current and proposed assumptions.

Work Related Disability Retirements					
	Actual	**Expected (Current)**	**A/E Ratio**	**Expected (Proposed)**	**A/E Ratio**
State					
Industrial	36	38	95%	No changes	
Safety	1,090	1,318	83%	1,064	102%
POFF	2,860	3,431	83%	2,895	99%
CHP	782	898	87%	784	100%
Schools	N/A	N/A	N/A	N/A	N/A
Public Agency					
Firefighters	1,584	1,885	84%	1,540	103%
Police	3,299	3,882	85%	3,359	98%
CPO	662	751	88%	657	101%

Terminations with Vested Benefits and Terminations with Refund

Summary

For terminations with vested benefits no changes to the current assumptions are being proposed. The actual versus expected ratios for the period of 1999 through 2011 ranged from 89% to 108%. Due to the fact that all of the plans were close to 100%, no changes are being proposed.

For terminations with refunds no changes to the current assumptions are being proposed. The actual versus expected ratios ranged from 88% to 116%. Due to the fact that all of the plans were close to 100%, no changes are being proposed.

Method

Terminations with vested benefits and terminations with refunds were looked at separately. All terminated members having less than 5 years of service were considered refunds.

The termination data from June 30, 1998 was found to be inconsistent (due to the implementation of new data extract programs in 1999) with the other years of data and was not included in the study.

For simplicity and to avoid double counting, only data from active members was included in the study.

Factors used for grouping data:

- Age: Termination rates declined as age increased. Age was used as a grouping factor for State Miscellaneous, Schools, Public Agency miscellaneous and State Industrial categories. However, safety groups generally have less variance in the age at date of hire than do miscellaneous groups. This results in a higher correlation with service and makes this factor less useful in predicting terminations. Given this effect and the lesser amount of data available for safety groups, age was not used as a grouping factor for safety categories.
- Service: Termination rates declined as service increased. Service is used as a grouping factor in the current rates for all employee categories.
- Employee Category: Significant differences were observed in the termination rates applicable to different employee categories. Separate tables of termination rates were used for miscellaneous members, police, firefighters and county peace officers.

Factors studied but not used for grouping data:

- Gender: While females generally terminated at slightly higher rates than males, the difference was insignificant compared to the effects of other factors.

The raw rates were fitted by fitting three line segments through the data. This methodology was used in the prior experience study and given the same pattern in the data was deemed to still be appropriate.

Results

Overall, no changes are being proposed due to the closeness between the actual versus expected decrements.

The table below compares the actual versus expected number of terminations with vested benefits.

Termination with Vested Benefits					
	Actual	**Expected (Current)**	**A/E Ratio**	**Expected (Proposed)**	**A/E Ratio**
State					
Miscellaneous Tier 1	18,656	18,069	103%	No Changes	
Industrial	1,304	1,319	99%	No Changes	
Safety	2,169	2,193	99%	No Changes	
POFF	3,492	3,713	94%	No Changes	
CHP	359	402	89%	No Changes	
Schools	49,596	47,243	105%	No Changes	
Public Agency					
Miscellaneous	33,820	34,063	99%	No Changes	
Firefighters	770	844	91%	No Changes	
Police	2,177	2,009	108%	No Changes	
CPO	1,046	1,125	93%	No Changes	

The table below compares the actual versus expected number of terminations with refunds.

Termination with Refunds					
	Actual	**Expected (Current)**	**A/E Ratio**	**Expected (Proposed)**	**A/E Ratio**
State					
Miscellaneous Tier 1	37,748	35,571	106%	No Changes	
Industrial	1,607	1,537	105%	No Changes	
Safety	6,405	5,901	109%	No Changes	
POFF	8,066	7,614	106%	No Changes	
CHP	272	310	88%	No Changes	
Schools	140,888	133,755	105%	No Changes	
Public Agency					
Miscellaneous	94,815	94,372	100%	No Changes	
Firefighters	1,527	1,372	111%	No Changes	
Police	3,795	3,268	116%	No Changes	
CPO	2,650	2,578	103%	No Changes	

Pre-Retirement Mortality – Non-work Related

Summary

The new graduated rates for non-work related pre-retirement mortality during the period 1997 through 2011 are lower than the current rates and vary by age and gender only. In the prior experience study for the ten year period 1997 through 2007 the study showed higher than expected rates of mortality. An improvement in mortality is seen over the duration of the study and this improvement is also seen in post-retirement mortality.

Method

Once again only the data from active members was used to study this decrement.

Factors used for grouping data:

- Age: Rates increase with age. Due to the small number of decrements the raw data was grouped into five year age bands.
- Gender: Male mortality rates are roughly 1.5 times the female rates.

Factors studied but not used for grouping data:

- Membership category: Rates for miscellaneous members are similar to those for safety members.

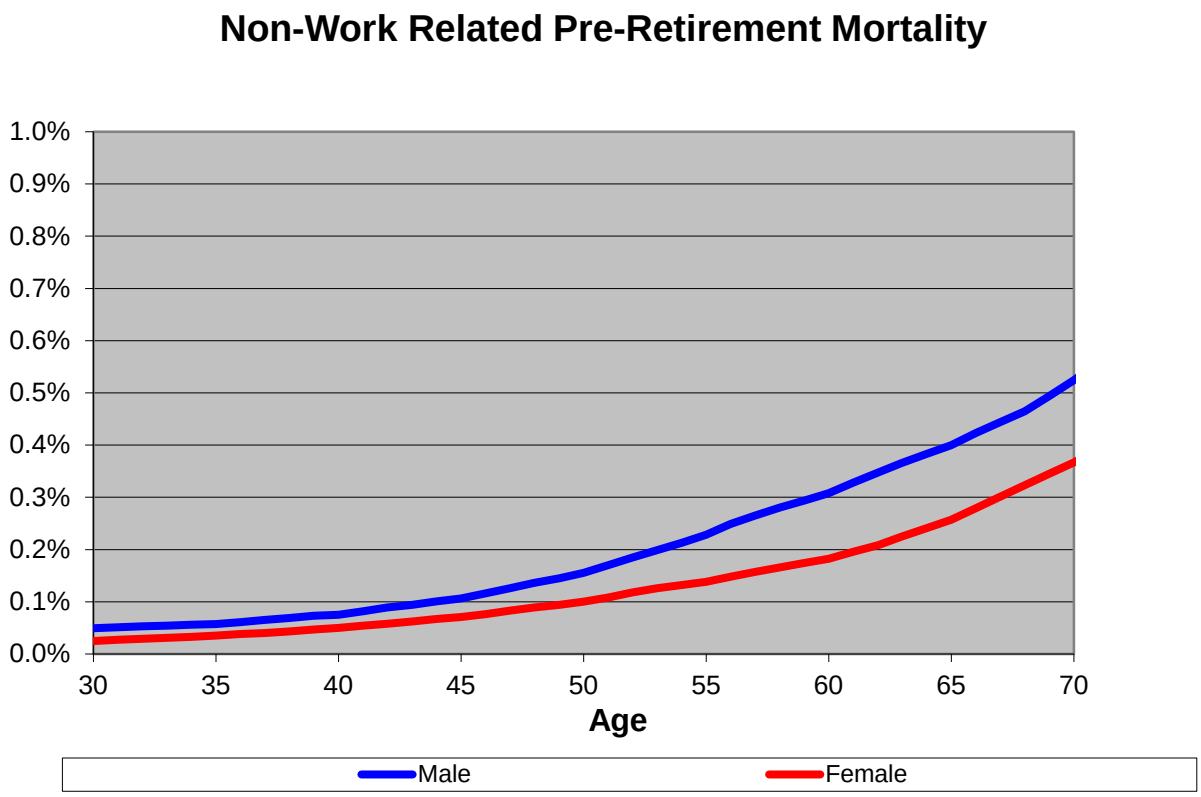
The raw rates were graduated using the Whittaker-Henderson method. Because of the low decrements, data is grouped by 5-year age bands e.g. age 25 is the average raw data of ages 23 through 27. These average 5-year data points are graduated using the Whittaker-Henderson methodology and then interpolated between 5 year points. For both the male and female rates at lower ages the raw rates are higher than expected but there is low exposure at early ages and the data is less credible. At these lower ages rates were fitted using a finite difference methodology.

Discussion

In the prior study, the ten year time period from 1997 through 2007, showed that the rates of pre-retirement non-work related mortality were higher than assumed and the rates were increased for both male and female. The current study shows an improvement in mortality during the last four years as well as over the entire fourteen years of experience. By way of comparison to standard mortality tables the new proposed rates are close to RP 2000 with a 4-year setback for males and RP 2000 with a 7-year setback for females. Actuarial Standards of Practice number 35 requires an explicit assumption for future mortality improvements. In September 2012 the Society of Actuaries published its Mortality Improvement Scale BB Report. CalPERS has implemented a 20 year static mortality improvement on the smoothed curve using the BB scale.

Results

The proposed rates of pre-retirement, non-work related mortality are shown in the graph below.



The table below compares the actual number of non-work related deaths with the expected number of such deaths under both the proposed and proposed with 20-year mortality improvement assumptions.

Non-Work Related Deaths					
	Actual	**Expected (Proposed)**	**A/E Ratio**	**Expected (with 20-yr BB scale)**	**A/E Ratio**
Male	7,050	7,659	92%	6,294	112%
Female	5,690	6,885	83%	5,034	113%

Pre-Retirement Mortality – Work Related

Summary

Observed rates of work related mortality during the fourteen year study period were consistent with the current rates in the aggregate; thus no changes to current rates are being recommended.

Method

Only active members are eligible for this benefit, so we studied only active member data. The number of decrements is very low and this severely limited the amount of data grouping that was possible.

The only factor used for grouping data was age:

- Age: Rates increase with age.

Factors studied but not used for grouping data:

- Gender: There were insufficient female decrements to group by gender.
- Employee Category: There were insufficient decrements.
- Employer Type: There were insufficient decrements.

Male data from Industrial, Safety, POFF, CHP, and Public Agency Safety plans was combined and grouped into 10-year bands by age. As there was insufficient data to justify a more exact treatment, a straight line was fitted to the raw data. There were only seven female decrements so male and female data was combined.

Results

The observed rates of work related mortality during the fourteen year study period were consistent with the current rates for ages greater than 30. The proposed rates of pre-retirement work related mortality are shown in the following graph.

The table below compares the actual number of work related deaths with the expected number of such deaths under both the current and proposed assumptions.

Work Related Deaths					
	Actual	**Expected (Current)**	**A/E Ratio**	**Expected (Proposed)**	**A/E Ratio**
All groups (non-Miscellaneous)	214	220	97%	No Changes	

Post-Retirement Mortality for Healthy Recipients

Summary

A new set of post-retirement mortality rates is being proposed for both male and female healthy recipients. We have seen improvements in post-retirement mortality rates for healthy male and female recipients. The new mortality rates are higher from ages 50 through 59 and lower from ages 60 through 110 for both genders.

Improved mortality leads to an increase in life expectancy. Assuming 20 years of projected mortality improvement, life expectancy at age 55 is expected to increase by 2.1 years for males and by 1.6 years for females by the year 2033 for healthy recipients.

In the previous two studies no material differences in the post-retirement mortality rates were observed between retirees from safety groups as compared to retirees from miscellaneous groups. The current study did not conduct a comparison of the two groups.

Method

Factors used for grouping data:

- Age
- Gender

Raw rates were developed by age and gender and then graduated (by age) using the Whittaker-Henderson method.

Mortality rates were studied by looking at the last 5 year (2006-2011) and the last 10 (2001-2011) years separately. In doing so, it became clear that mortality improvements had occurred over both periods. In the last study, 5 years of projected on-going mortality improvement using the Scale AA published by the Society of Actuaries was applied to the mortality rates to bring the then graduated rates from the midpoint of the last study to 2010. This scale consists of an expected annual improvement in mortality that varies by age and also differs for males and females. The expected improvement is greater for males than females. Using Scale AA projections over the period covering the last experience study has shown that the projection closely matched actual experience.

Since the last study, Scale BB has been published by the Society of Actuaries as a tool for actuaries to project mortality improvement. Scale BB is an updated mortality improvement scale recently published from studies done on social security data and replaces Scale AA. Scale BB consists of an expected annual improvement in mortality that varies by age and also differs for males and females. The expected improvement is greater, at most ages, for males than females.

In October 2013, the Actuarial Office conducted a Board workshop on projecting mortality improvement. In that workshop there was considerable discussion about the level of future

improvement to assume. As was discussed at that time, there is at least one consideration – the lower level of smoking in California – which could indicate that future improvements in mortality will be less in the future in California relative to the rest of the nation. In effect, smoking rates do not have as much room to fall so mortality improvements may be less.

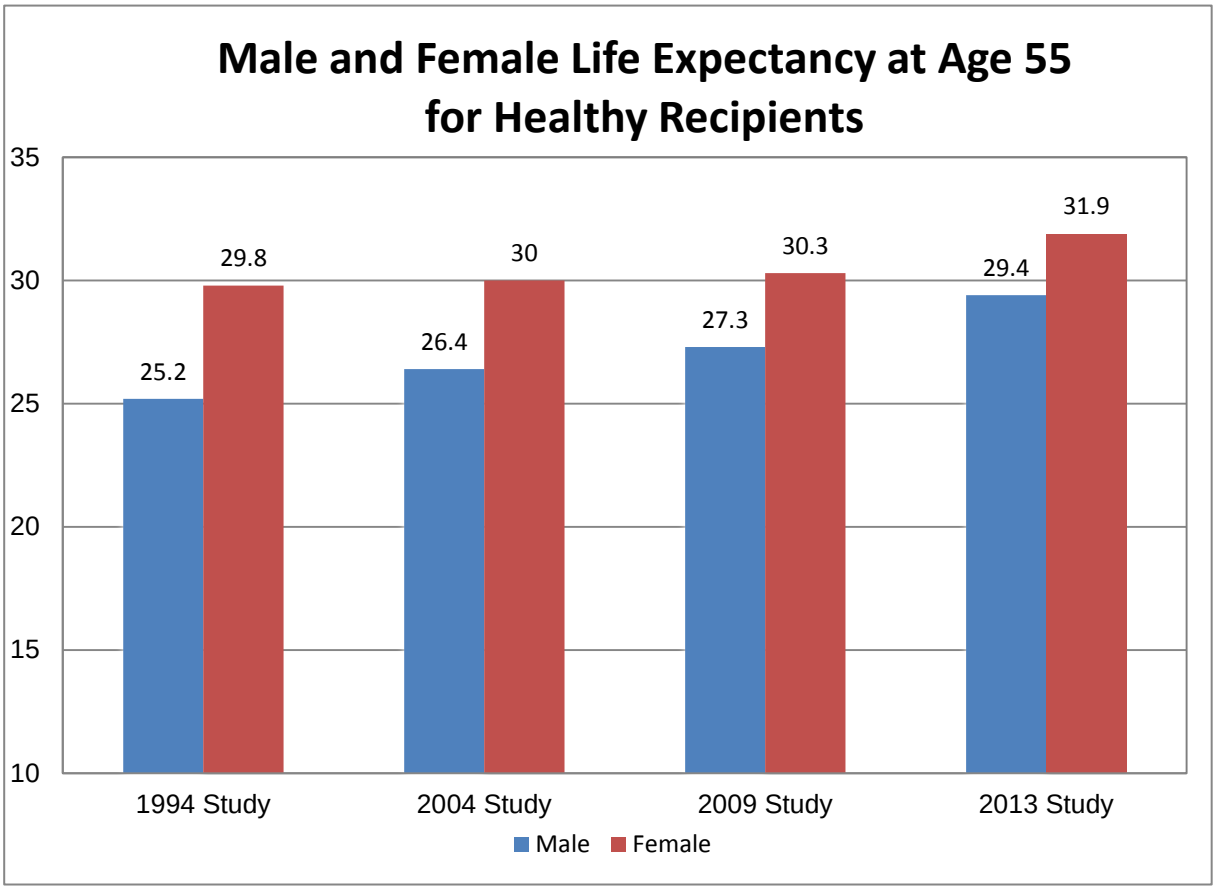
There are other factors that one could argue for the application of mortality improvements using something higher than Scale BB. They include an indication that mortality is improving faster amongst groups with higher levels of educational attainment and better access to health care and the higher rates of improvement experienced by the CalPERS covered population in recent years.

In this study, we propose including 20 years of projected on-going mortality improvement using Scale BB published by the Society of Actuaries to bring the graduated mortality rates from the midpoint of the study to the expected duration of the liabilities. Scale BB is an updated mortality improvement scale recently published from studies done on social security data and replaces Scale AA. The 20 year projection is composed of a seven year portion which would bring us from the midpoint of the 5 years study period to the current valuation cycle and 13 more years to match the duration of the liabilities of the PERF.
In the previous study, a smoothing transition was applied at age 50, that is, we blended the graduated service retiree mortality rates with the pre-retirement active mortality rates prior to age 50. This smoothing technique was applied for ages 50 through to age 63 inclusively with the effect of lowering rates in the first few years beginning at age 50 as active mortality rates under age 50 are significantly lower than mortality rates for retirees at age 50 and onwards. For this study that smoothing technique was eliminated with the rationale that experience has shown that mortality rates are generally higher in the first few years of retirement reflecting poor health of a proportion of recently retired active members. It would appear that this portion of retirees is ensuring that they receive their pension value, whether to themselves or to their beneficiaries. In this study, the male and female service retiree raw rates between ages 50 and 99 were graduated using the Whittaker-Henderson method. Then, exponential interpolation was used to derive mortality estimates for ages below age 50. Those rates were then projected to reflect 20 years of mortality improvement using Scale BB. Finally, due to insufficient exposures to calculate any meaningful raw rates at ages 100 through 110, the current rates for current healthy recipients were used for those ages and were also projected forward to reflect 20 years of mortality improvement.

Results

Mortality rates increase with age. Male mortality rates are higher than female mortality rates. The new mortality rates are higher at ages 50 through 59 for both male and female. The new mortality rates for both genders are lower from ages 60 through 110. The lower mortality rates indicate an increase in the life expectancy for both genders.

Life expectancy is the average remaining number of years a member is expected to live if subjected the rest of his or her life to the current mortality assumptions. The chart below provides a comparison of life expectancy at age 55 for both male and female healthy recipients, based on prior, current CalPERS mortality experience. Life expectancy at age 55 is expected to increase by 2.1 years for males and by 1.6 years for females for healthy recipients.



The table below provides a comparison of the life expectancy for males and females under the current assumptions and the proposed assumptions which include 20 years of mortality improvement. For example, based on the current assumptions, you would expect a male age 50 to live 31.8 more years and a female the same age to live 35.0 more years.

Life Expectancy (In Years) Healthy Recipients				
ATTAINED AGE	CURRENT ASSUMPTIONS		ASSUMPTIONS WITH 20 YEARS OF MORTALITY IMPROVEMENT	
	Male	Female	Male	Female
50	31.8	35.0	33.5	36.1

55	27.3	30.3	29.4	31.9
60	23.0	25.7	25.2	27.5
65	18.9	21.3	21.1	23.1
70	15.0	17.3	17.0	18.9

The table below provides information on the actual number of deaths and the expected number of deaths for healthy retirees, beneficiaries and community property members under the current and proposed assumptions which include 20 years of mortality improvement. Using Scale BB which is the new Society of Actuaries mortality improvement scale and assuming 20 years of projected mortality improvement, we expect about a 29% reduction in mortality for males and a 24% reduction for females.

Healthy Recipient, Beneficiary and Community Property Mortality					
	CURRENT ASSUMPTIONS			**ASSUMPTIONS WITH 20 YEARS OF MORTALITY IMPROVEMENT**	
	Actual	**Expected**	**A/E Ratio**	**Expected**	**A/E Ratio**
Female	39,138	39,537	99%	31,689	124%
Male	28,385	28,689	99%	21,936	129%

Post-Retirement Mortality for Non-Work related Disabled Retirees

Summary

A new set of post-retirement mortality rates is being proposed for both male and female non-work related disabled recipients. The new mortality rate assumptions for non-work related disability male retirees are higher at ages 50 through 59 and lower at all other ages. For the female, the new mortality assumptions produce lower mortality rates at all ages.

Method

Factors used for grouping data:

- Age
- Gender

Raw rates were developed by age and gender and then graduated (by age) using the Whittaker-Henderson method. Mortality rates increase with age.

Mortality rates for non-work related disabled retirees were studied by looking at the last 5 year (2006-2011) and the last ten year (2001-2011) time periods separately. In doing so, it became clear that mortality improvements had occurred over both time periods.

For the non-work related disabled retirees, the male and female service retiree raw rates between ages 50 and 99 were graduated using the Whittaker-Henderson method. Exponential interpolation was then used to derive mortality estimates for ages below age 50. These rates were also then projected to reflect 20 years of mortality improvement using Scale BB. Finally, due to insufficient exposures to calculate any meaningful raw rates between ages 100 through 110, the proposed rates for non-work related disabled retirees at those ages are the mortality rates proposed for the healthy recipients.

Results

Mortality rates increase with age. Male mortality rates are higher than female mortality rates. The new mortality rates for non-work related males are lower at all ages except for ages 50 through 59. The new female mortality rates for non-work disabled retirees are lower at all ages.

For the non-work related recipients, the increase in life expectancy is significantly greater for men than women at ages 62 and above.

The table below provides a comparison of the life expectancy for males and females under the current assumptions and the proposed assumptions which include 20 years of mortality

improvement. For example, based on the current assumptions, you would expect a male age 50 to live 23.4 more years and a female the same age to live 25.4 more years.

Life Expectancy (In Years) Non-Work Related Disabled Recipient				
ATTAINED AGE	CURRENT ASSUMPTIONS		ASSUMPTIONS WITH 20 YEARS OF MORTALITY IMPROVEMENT	
	Male	Female	Male	Female
30	35.7	42.1	39.2	45.0
40	29.0	34.2	32.0	37.0
50	23.4	27.0	25.4	29.6
60	17.2	20.7	19.8	22.7
70	11.6	14.2	14.1	15.7

The table below compares the actual number of deaths with the expected number of deaths for non-work related retirees under both the current and proposed assumptions which include 20 years of mortality improvement. Using Scale BB which is the new Society of Actuaries mortality improvement scale and assuming 20 years of projected mortality improvement, we expect about a 26% reduction in mortality for males and a 23% reduction for females.

Non Work Related Disability Mortality					
	CURRENT ASSUMPTIONS			ASSUMPTIONS WITH 20 YEARS OF MORTALITY IMPROVEMENT	
	Actual	Expected	A/E Ratio	Expected	A/E Ratio
Female	2,749	2,776	99%	2,227	123%
Male	2,732	2,790	98%	2,165	126%

Post-Retirement Mortality for Work related Disabled Retirees

Summary

A new set of post-retirement mortality rates is being proposed for both male and female work related disabled recipients. The new mortality rates for work related disability male retirees are higher at ages 37 through 55 and lower at all other ages. For the female, the new mortality assumptions produce higher mortality rates from ages 43 through 53 and lower at all the other ages.

Method

Factors used for grouping data:

- Age
- Gender

Raw rates were developed by age and gender and then graduated (by age) using the Whittaker-Henderson method.

Just as with mortality rates for healthy and non- work related recipients, mortality rates for work related disabled retirees were also studied by looking at the last 5 years (2006-2011) and the last ten years (2001-2011) time periods separately. In doing so, it became clear that mortality improvements had occurred over both time periods. As a result, we propose to include 20 years of projected on-going mortality improvement using the Scale BB published by the Society of Actuaries.

The raw rates for ages 50 and above were graduated using the Whitaker-Henderson method and then modified to reflect 20 years of mortality improvement using Scale BB published by the Society of Actuaries. Service retirement rates are used for work related disability retiree estimates of mortality between ages 50 through 57 because the work related rates were unreliable when compared with service retirements rates for the same ages.

Exponential interpolation was used to derive mortality estimates for ages 50 and below. Those rates were then projected to reflect 20 years of mortality improvement using Scale BB.

Due to insufficient data for recipients above 90 years of age for non- work related disability, we have used the proposed service retirement rates for those ages.

Results

Mortality rates increase with age. Male mortality rates are higher than female mortality rates. The new mortality rates for work related disabled male recipients are higher at ages 37 through 59 and lower at other ages. The new mortality rates for work related disabled female recipients are higher at ages 43 through 53 and lower at other ages.

Life Expectancy (In Years) Work Related Disabled Recipient				
ATTAINED AGE	CURRENT ASSUMPTIONS		ASSUMPTIONS WITH 20 YEARS OF MORTALITY IMPROVEMENT	
	Male	Female	Male	Female
30	48.4	50.5	50.3	52.7
40	39.2	41.4	41.1	43.4
50	30.1	32.3	32.3	34.5
60	21.5	23.8	23.9	25.8
70	13.9	16.0	16.0	17.6

The table below compares the actual number of deaths with the expected number of deaths for work related retirees under both the current and proposed assumptions which include 20 years of mortality improvement. Using Scale BB which is the new Society of Actuaries mortality improvement scale and assuming 20 years of projected mortality improvement, we expect about a 27% reduction for males and a 5% reduction for females.

Work Related Disability Mortality					
	CURRENT ASSUMPTIONS			ASSUMPTIONS WITH 20 YEARS OF MORTALITY IMPROVEMENT	
	Actual	Expected	A/E Ratio	Expected	A/E Ratio
Female	147	170	86%	140	105%
Male	2,007	1,997	100%	1,583	127%

Salary Increase

Summary

The new proposed salary assumptions are changing for all membership and organizational categories. The study has shown that:

- Salary increases are slightly lower than expected by the current assumptions for the local agency miscellaneous and State Industrial.
- The Schools pool, State Safety and State Industrial groups experienced slightly higher salary increases at most age and service levels than what was expected from the current assumptions.
- Local agency Safety groups, State CHP, POFF and State Miscellaneous had experienced higher than expected pay increases at higher service levels than what the current assumptions had predicted. State Miscellaneous' proposed assumptions have been developed from the last ten year period as described below.

Method

The study included data from active members only.

Factors used for grouping data:

- Entry Age: Employees with lower entry ages tend to get larger pay increases at the same amount of service.
- Service: Salary increases are generally higher for low-service individuals.
- Membership Category
- Organization Category
- Periods Studied: Last 5 years, last 10 years and last 14 years.

Factors not used for grouping data:

- Gender: The two past studies observed nearly identical patterns of salary increase for males and females and were grouped as such.

Sources of salary increases: Seniority, Merit, and Promotion (SMP) and Inflation.

Salary increases can be thought of as the product of two distinct components: increases due to wage inflation and increases due to seniority, merit and promotion. Salary increases due to wage inflation tend to be driven by global or national trends although they can also be driven by industry specific trends as well. As such, these increases are best treated as an economic assumption and should be considered in conjunction with other economic assumptions such as price inflation and real rates of return. The pattern of increases due to seniority, merit and promotion tend to differ due to member specific or employer specific factors and are best treated as a demographic assumption. In this study, only the seniority, merit and promotion

component of salary increases was studied. The salary increase assumptions recommended in this study should be combined with a wage inflation assumption to get total expected salary increases.

As part of this study, the data for developing a new set of salary increase assumptions was studied using a closed group method. The closed group study method is described in detail in a book called "Fundamentals of Private Pension Plans" by McGill.

The book indicates that the proper way to construct a merit salary scale is to examine the historical relationship between the average compensation of employees at various ages to the average compensation of the entire population. For example, if in year 1 the average salary of members age 30 with 5 years of service is 50% of the average salary of the total population and that in year 2 the average salary of those same members still working and now age 31 with 6 years of service is 52% of the average salary of the total population then the merit salary increase between year 1 and year 2 for that age and service group was 4% (52 divided by 50). We used this method and calculated a merit salary increase for each age and service cell for each of the fiscal years between June 30, 1997 and June 30, 2011. Finally the merit salary increase for each age and service cell for the 14 year period were averaged over the years based on the number of people present in each cell in each of those years. These average increases were then graphed and fitted using a log function splined at years 8, 9 or 10 depending on the observed curve that resulted. Other curves were fitted using manual smoothing due to known or visual discontinuities such contractual longevity increases in years further out in the service period.

Results

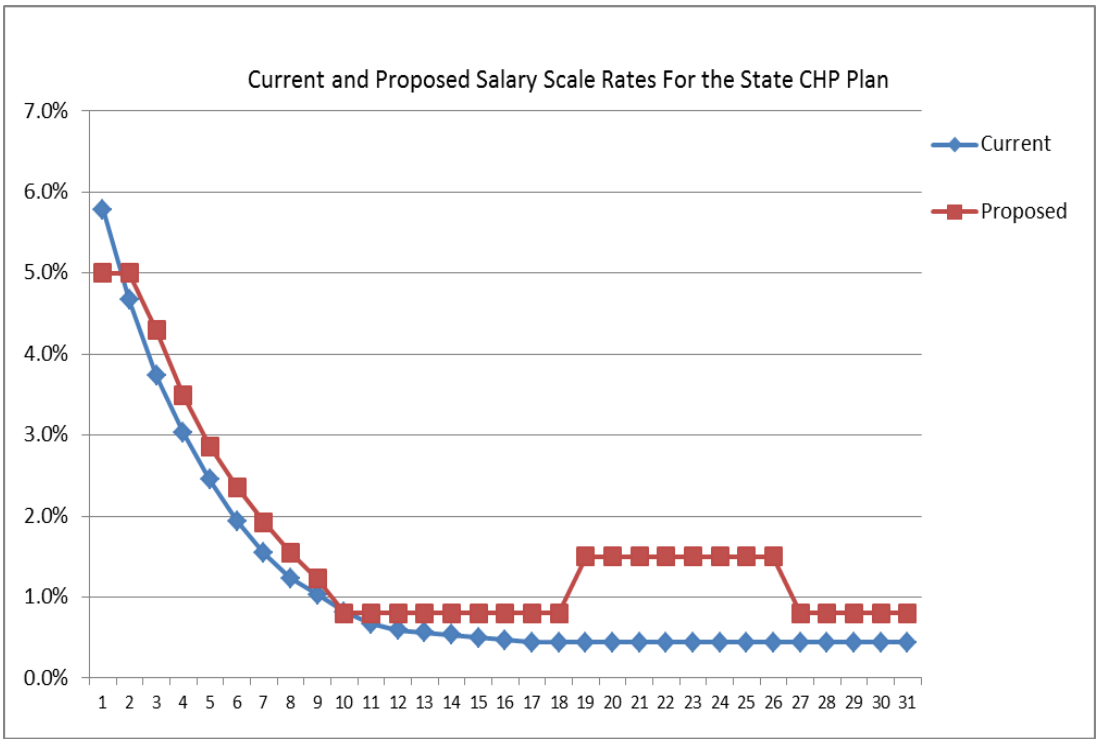
In the previous two studies, the data was studied using two separate methods, the transverse method and the closed group method. Both methods' results had led to the same conclusion that our current assumptions are appropriate at lower service levels but should be increased at later service. In the last study, the ultimate merit salary increase assumption was set between 0.1% and 0.6% above wage inflation depending on entry age, membership or organizational category for members with higher service.

In performing this study, it was clear that the data had shown for local Safety members, State CHP, POFF and Miscellaneous that members with high service continued to receive salary increases above what the current assumptions had expected. After observing this, different periods were studied to see any variations. The last 14, 10 and 5 year periods were examined and found very little variability. The only real difference was the State Miscellaneous plan. For that plan the last 10 year period was selected as a reasonable proxy for future salary rates based on the fact that recent payroll growth that was significantly lower than what occurred in the late 1990's. The State Controller's Office confirmed this observation and expected that future growth over the next several years would be similar to the past ten years rather than the past 14 years. This 10 year period shows a similar pattern to the current salary rates.

Overall we believe that for those plans where the new salary rates are increasing that they are legitimate and are probably the result of promotional opportunity late in an individual's career

possibly due to the higher levels of retirement for some plans and the result of more employers, especially for safety members, offering longevity salary increases.

Below is a chart comparing the current merit salary assumptions for State CHP to the proposed merit salary assumptions for a member hired at age 25. It reflects 2% seniority pay increases at years 17 thru 25 of service and illustrates the effect that longevity or seniority increases have on salary scale patterns.



Below are tables showing the current and proposed ultimate merit salary increase for each of the groups. Note that the assumed wage inflation of 3.00% is added to these merit increases to obtain the overall assumed salary increase used in the actuarial valuations. For example, if the ultimate rate in the table below is 0.5%, the assumed ultimate salary increase rate used in the actuarial valuations is 3.50%. Also, the current assumptions vary based on entry age and service; the proposed new assumptions continue to do so.

Current Assumptions (Ultimate Only)

Group	Members with an Entry Age between 15 and 29	Members with an Entry Age between 30 and 39	Members with an Entry Age of more than 40
State Miscellaneous	0.5%	0.5%	0.2%
State Industrial	0.6%	0.6%	0.6%
State Safety	0.6%	0.3%	0.1%
State POFF	0.4%	0.4%	0.4%
State CHP	0.4%	0.4%	0.4%
Schools	0.4%	0.3%	0.1%
Public Agency			
Miscellaneous	0.6%	0.5%	0.1%
Firefighters	0.5%	0.4%	0.1%
Police	0.5%	0.3%	0.3%
CPO	0.5%	0.3%	0.3%

Proposed Assumptions (Ultimate Only)

Group	Members with an Entry Age between 15 and 29	Members with an Entry Age between 30 and 39	Members with an Entry Age of more than 40
State Miscellaneous	0.5%	0.5%	0.3%
State Industrial	0.6%	0.6%	0.6%
State Safety	0.6%	0.3%	0.1%
State POFF	1.2%	0.9%	0.6%
State CHP	0.8%	0.8%	0.8%
Schools	0.5%	0.2%	0.0%
Public Agency			
Miscellaneous	0.5%	0.3%	0.0%
Firefighters	0.8%	0.4%	0.3%
Police	1.5%	1.1%	0.3%
CPO	1.6%	1.3%	0.3%

Economic Study

To perform actuarial valuations, and in addition to demographic assumptions, actuaries use certain economic assumptions to set a contribution schedule of employee and employer contributions designed to accumulate with interest to equal the total present value of benefits by the time every member has left employment. The assumptions used by actuarial staff to determine liabilities and set contribution rates are price inflation, wage inflation, payroll growth and the discount rate assumption.

Price Inflation

Price inflation is a progressive increase in the general level of prices. It is usually measured by annual increases in the Consumer Price Index. It is referenced in the Public Employees Retirement Law for determining the annual cost-of-living adjustment (COLA) for CalPERS retirees. The inflation assumption also underlies most of the other economic assumptions used in the actuarial valuation, including the investment return, individual salary increases, payroll growth, and COLA assumptions. Changing the price inflation assumption would have an impact on employer contribution rates, service credit purchases, and Optional Settlements at retirement.

Currently, the Actuarial Office uses a 2.75 percent annual price inflation assumption which was recently reduced from 3.00% in the last economic study in 2012. In 2004 this assumption was lowered from 3.50 percent to 3.00 percent.

In February of 2012 the Actuarial Office, hired a consulting firm to perform a review of various economic assumptions. The results of that study showed that price inflation has declined over the last century. It has ranged from 3.23 percent (over the past 100 years) to 2.15 percent (over the last 5 years). It would be difficult to ignore the steady decline over the past 25 years.

The study indicated that a reasonable long term inflation assumption is between 2.50 percent and 3.00 percent. They recommended decreasing the inflation assumption from 3.00 percent to 2.75 percent. The report also indicated that inflation has been 2.57 percent for the last 20 years. The report also quotes forecast of price inflation from investment consulting firms, bond markets, as well as, other sources including the Office of the Chief Actuary for the Social Security Administration. Most of the long- term forecasts provided in the report put inflation in the 2.4 percent to 3.0 percent range. Since that 2012 study, price inflation has still registered under 2% per year.

Going forward, market indicators today point to an expectation that future price inflation may be less than the current assumption of 2.75 percent per year. Staff is not recommending a change at this time and will revisit this assumption as part of the next review of assumptions in four years.

Wage Inflation

The salary growth or increase assumption is comprised of three components: price inflation, real wage inflation, and merit increases. Price inflation was discussed in the section above while merit increases have been discussed with new recommendations in the Salary Increase section. The real wage inflation is the wage inflation net of price inflation.

Currently, the real wage inflation assumption is 0.25 percent. The real wage inflation assumption has not been changed since 1998. At that time, it was increased from 0.00 percent to 0.25 percent.

In the previous economic study the Actuarial Office believed that wage inflation would be subdued in the near term due to the economic environment. Anecdotal evidence from the last two annual valuation processes confirmed this observation. In light of the continued expected low growth economic environment and the continual increases in employer rates over the next several years, the Actuarial Office maintains its belief that low wage inflation is likely to continue in the near term. Historical data shows that wage inflation has generally been higher than price inflation by close to one percent. Staff expects that over time the real wage inflation assumption will need to move toward the historical levels of wage inflation. The Actuarial Office is not recommending a change to the real wage inflation assumption at this time.

Discount Rate

The primary economic assumption used in actuarial valuations is the discount rate assumption which ties directly to the assumed investment return plus a margin for adverse deviation, if applicable. The current discount rate assumption is 7.50 percent. The discount rate assumption used for actuarial valuations is comprised of a real return assumption and an inflation assumption. The current price inflation and real return assumptions are 2.75 percent and 4.75 percent per year respectively. This discount rate was adopted in March of 2012 by reducing the inflation assumption to 2.75% from 3.00%.

The Board reviewed the assumed investment return in March 2011. In March of 2011, a discussion surrounding the real discount rate took place with the Board. Staff recommended a positive margin and stated a margin is preferable for the long term security of benefits of our members while keeping in mind that such margin should not be excessive in order to preserve generational equity.

Over the course of the last year, the Board has reviewed its capital market assumptions and had an Asset Liability Management (ALM) workshop in November 2013. At that workshop the Board expressed a preference for a level of funding risk consistent with the base case portfolio and no margin for adverse deviation. Assuming that the Board adopts an asset allocation substantially similar in risk/return characteristics, the Actuarial Office is not recommending any change to the discount rate assumption – that it remain at 7.5% per year.

Payroll Growth

The payroll growth assumption is used when amortizing the unfunded liability of open plans as a level percentage of payroll in accordance with Board policy. The current Board adopted assumption is that payroll of open plans will grow at a rate of 3% per year. In effect, the current payroll growth assumption results in the assumption that when amortizing the unfunded liability, the workforce of the plan is assumed to remain constant over time. This assumption is appropriate and staff is not recommending any changes to this assumption.

The application of this assumption to the "classic" risk pools that were closed as a result of PEPRA is a subject of concern and should not be continued going forward since "classic" risk pools will not see the same level of new employees has it has in the past as a result of PEPRA. As a result, staff is looking to implement changes to the risk pooling structure that would allow the continued use of the 3% payroll growth assumption. This topic is the subject of another agenda item in December 2013.

Recommendation

We recommend adopting the actuarial assumptions as discussed above and as summarized in Appendix A.

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Appendix A – Summary of Proposed Rates

Service Retirement Rates

Service Retirement Miscellaneous Tier 1 – 2%@55							
	Years of Service						
Attained Age	5	10	15	20	25	30	35
50	0.002	0.008	0.014	0.017	0.024	0.036	0.041
51	0.002	0.007	0.011	0.014	0.021	0.033	0.037
52	0.002	0.009	0.013	0.016	0.024	0.036	0.040
53	0.004	0.011	0.017	0.021	0.030	0.042	0.048
54	0.007	0.022	0.031	0.038	0.052	0.068	0.077
55	0.017	0.048	0.069	0.085	0.108	0.134	0.154
56	0.014	0.039	0.057	0.070	0.090	0.113	0.129
57	0.016	0.044	0.064	0.079	0.100	0.126	0.143
58	0.017	0.048	0.069	0.086	0.108	0.134	0.155
59	0.021	0.059	0.083	0.103	0.130	0.160	0.184
60	0.027	0.074	0.105	0.130	0.163	0.198	0.228
61	0.030	0.085	0.120	0.149	0.186	0.225	0.258
62	0.050	0.136	0.192	0.238	0.295	0.353	0.406
63	0.050	0.137	0.193	0.238	0.296	0.353	0.407
64	0.041	0.114	0.161	0.198	0.246	0.297	0.341
65	0.054	0.146	0.207	0.255	0.316	0.378	0.435
66	0.048	0.134	0.190	0.233	0.290	0.348	0.400
67	0.042	0.114	0.162	0.200	0.249	0.298	0.344
68	0.039	0.108	0.153	0.189	0.235	0.283	0.326
69	0.044	0.119	0.169	0.208	0.259	0.311	0.358
70	0.047	0.128	0.181	0.223	0.278	0.332	0.383
71	0.039	0.107	0.153	0.188	0.235	0.283	0.325
72	0.038	0.106	0.152	0.187	0.233	0.281	0.322
73	0.033	0.089	0.127	0.157	0.197	0.237	0.273
74	0.037	0.100	0.141	0.175	0.217	0.262	0.303
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement Industrial Tier 1 – 2%@55
NO CHANGES BEING PROPOSED

Service Retirement
State Safety – 2.5%@55

	Years of Service						
Attained Age	**5**	**10**	**15**	**20**	**25**	**30**	**35**
50	0.005	0.012	0.018	0.035	0.039	0.067	0.075
51	0.001	0.005	0.008	0.023	0.025	0.050	0.054
52	0.003	0.009	0.014	0.032	0.034	0.061	0.067
53	0.005	0.012	0.018	0.036	0.040	0.068	0.075
54	0.017	0.032	0.046	0.067	0.075	0.113	0.131
55	0.039	0.068	0.095	0.125	0.139	0.196	0.228
56	0.031	0.056	0.077	0.105	0.117	0.167	0.195
57	0.030	0.054	0.077	0.104	0.115	0.165	0.191
58	0.035	0.062	0.087	0.115	0.128	0.182	0.212
59	0.033	0.059	0.081	0.109	0.122	0.174	0.201
60	0.042	0.073	0.102	0.134	0.148	0.208	0.243
61	0.052	0.090	0.124	0.160	0.178	0.247	0.288
62	0.067	0.115	0.158	0.199	0.222	0.305	0.357
63	0.068	0.117	0.162	0.203	0.227	0.311	0.363
64	0.065	0.113	0.156	0.197	0.219	0.301	0.352
65	0.086	0.148	0.203	0.252	0.281	0.382	0.448
66	0.088	0.152	0.207	0.256	0.285	0.387	0.454
67	0.086	0.148	0.202	0.252	0.279	0.379	0.445
68	0.081	0.138	0.190	0.237	0.263	0.358	0.421
69	0.102	0.176	0.239	0.295	0.328	0.443	0.521
70	0.083	0.143	0.196	0.244	0.271	0.368	0.433
71	0.096	0.166	0.227	0.281	0.312	0.422	0.495
72	0.098	0.169	0.232	0.286	0.318	0.429	0.504
73	0.075	0.130	0.179	0.224	0.249	0.339	0.398
74	0.104	0.179	0.246	0.302	0.336	0.453	0.533
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement
POFF – 3%@55

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.016	0.052	0.070	0.091	0.146	0.213	0.247
51	0.010	0.036	0.048	0.065	0.104	0.147	0.170
52	0.014	0.044	0.060	0.080	0.125	0.180	0.209
53	0.016	0.054	0.072	0.093	0.149	0.216	0.251
54	0.019	0.064	0.087	0.110	0.176	0.261	0.302
55	0.023	0.078	0.105	0.132	0.213	0.317	0.368
56	0.022	0.074	0.100	0.126	0.203	0.301	0.350
57	0.021	0.071	0.097	0.122	0.197	0.293	0.339
58	0.025	0.081	0.109	0.137	0.220	0.328	0.381
59	0.027	0.089	0.120	0.148	0.239	0.360	0.417
60	0.026	0.088	0.120	0.149	0.241	0.360	0.418
61	0.027	0.091	0.124	0.153	0.248	0.372	0.432
62	0.030	0.099	0.133	0.164	0.267	0.401	0.467
63	0.027	0.091	0.123	0.152	0.246	0.371	0.430
64	0.032	0.107	0.144	0.177	0.288	0.435	0.505
65	0.030	0.103	0.139	0.171	0.277	0.418	0.486
66	0.028	0.095	0.129	0.159	0.258	0.388	0.451
67	0.035	0.117	0.158	0.193	0.314	0.476	0.553
68	0.029	0.096	0.130	0.160	0.260	0.392	0.455
69	0.041	0.136	0.184	0.222	0.363	0.554	0.644
70	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement
CHP – 3%@50

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.050	0.050	0.050	0.050	0.149	0.283	0.326
51	0.038	0.038	0.038	0.038	0.112	0.213	0.245
52	0.040	0.040	0.040	0.040	0.121	0.230	0.265
53	0.038	0.038	0.038	0.038	0.114	0.217	0.250
54	0.051	0.051	0.051	0.051	0.153	0.290	0.334
55	0.050	0.050	0.050	0.050	0.149	0.282	0.325
56	0.051	0.051	0.051	0.051	0.152	0.288	0.332
57	0.051	0.051	0.051	0.051	0.154	0.293	0.337
58	0.049	0.049	0.049	0.049	0.146	0.277	0.319
59	0.088	0.088	0.088	0.088	0.263	0.500	0.576
60	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement Schools – 2%@55
NO CHANGES BEING PROPOSED

Service Retirement Public Agency Miscellaneous – 2%@60							
	Years of Service						
Attained Age	**5**	**10**	**15**	**20**	**25**	**30**	**35**
50	0.010	0.013	0.015	0.018	0.019	0.021	0.023
51	0.009	0.011	0.014	0.016	0.017	0.019	0.021
52	0.011	0.014	0.017	0.020	0.022	0.024	0.026
53	0.010	0.012	0.015	0.017	0.020	0.021	0.022
54	0.015	0.019	0.023	0.025	0.029	0.031	0.034
55	0.022	0.029	0.035	0.040	0.045	0.049	0.054
56	0.018	0.024	0.028	0.033	0.036	0.040	0.044
57	0.024	0.032	0.038	0.043	0.049	0.053	0.058
58	0.027	0.036	0.043	0.049	0.055	0.061	0.067
59	0.033	0.044	0.054	0.061	0.068	0.076	0.083
60	0.056	0.077	0.092	0.105	0.117	0.130	0.142
61	0.071	0.097	0.118	0.134	0.149	0.166	0.182
62	0.117	0.164	0.198	0.224	0.250	0.280	0.307
63	0.122	0.171	0.207	0.234	0.261	0.292	0.321
64	0.114	0.159	0.193	0.218	0.244	0.271	0.298
65	0.150	0.209	0.255	0.287	0.321	0.358	0.393
66	0.114	0.158	0.192	0.217	0.243	0.270	0.297
67	0.141	0.196	0.238	0.270	0.301	0.337	0.369
68	0.103	0.143	0.174	0.196	0.219	0.245	0.268
69	0.109	0.153	0.185	0.209	0.234	0.261	0.286
70	0.117	0.162	0.197	0.222	0.248	0.277	0.304
71	0.098	0.137	0.165	0.188	0.209	0.233	0.256
72	0.108	0.150	0.182	0.206	0.229	0.255	0.281
73	0.082	0.115	0.138	0.157	0.175	0.195	0.214
74	0.093	0.129	0.156	0.177	0.197	0.219	0.241
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement
Public Agency Miscellaneous 2%@55

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.014	0.018	0.021	0.025	0.027	0.031	0.035
51	0.012	0.014	0.017	0.020	0.021	0.025	0.028
52	0.013	0.017	0.019	0.023	0.025	0.028	0.032
53	0.015	0.020	0.023	0.027	0.030	0.034	0.039
54	0.026	0.033	0.038	0.045	0.051	0.059	0.068
55	0.048	0.061	0.074	0.088	0.100	0.117	0.132
56	0.042	0.053	0.063	0.075	0.085	0.100	0.113
57	0.044	0.056	0.067	0.081	0.091	0.107	0.121
58	0.049	0.062	0.074	0.089	0.100	0.118	0.134
59	0.057	0.072	0.086	0.103	0.118	0.138	0.156
60	0.067	0.086	0.103	0.123	0.139	0.164	0.186
61	0.081	0.103	0.124	0.148	0.168	0.199	0.224
62	0.116	0.147	0.178	0.214	0.243	0.288	0.324
63	0.114	0.144	0.174	0.208	0.237	0.281	0.317
64	0.108	0.138	0.166	0.199	0.227	0.268	0.302
65	0.155	0.197	0.238	0.285	0.325	0.386	0.435
66	0.132	0.168	0.203	0.243	0.276	0.328	0.369
67	0.122	0.155	0.189	0.225	0.256	0.304	0.343
68	0.111	0.141	0.170	0.204	0.232	0.274	0.309
69	0.114	0.144	0.174	0.209	0.238	0.282	0.317
70	0.130	0.165	0.200	0.240	0.272	0.323	0.364
71	0.107	0.137	0.164	0.198	0.225	0.266	0.299
72	0.110	0.140	0.169	0.202	0.230	0.272	0.307
73	0.085	0.109	0.132	0.158	0.179	0.212	0.239
74	0.100	0.129	0.156	0.186	0.212	0.251	0.282
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement
Public Agency Miscellaneous 2.5%@55

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.004	0.009	0.019	0.029	0.049	0.094	0.100
51	0.004	0.009	0.019	0.029	0.049	0.094	0.100
52	0.004	0.009	0.020	0.030	0.050	0.095	0.101
53	0.008	0.014	0.025	0.036	0.058	0.104	0.110
54	0.024	0.034	0.050	0.066	0.091	0.142	0.152
55	0.066	0.088	0.115	0.142	0.179	0.241	0.263
56	0.042	0.057	0.078	0.098	0.128	0.184	0.199
57	0.041	0.057	0.077	0.097	0.128	0.183	0.198
58	0.045	0.061	0.083	0.104	0.136	0.192	0.208
59	0.055	0.074	0.098	0.123	0.157	0.216	0.235
60	0.066	0.088	0.115	0.142	0.179	0.241	0.263
61	0.072	0.095	0.124	0.153	0.191	0.255	0.278
62	0.099	0.130	0.166	0.202	0.248	0.319	0.350
63	0.092	0.121	0.155	0.189	0.233	0.302	0.331
64	0.091	0.119	0.153	0.187	0.231	0.299	0.328
65	0.122	0.160	0.202	0.245	0.297	0.374	0.412
66	0.138	0.179	0.226	0.272	0.329	0.411	0.452
67	0.114	0.149	0.189	0.229	0.279	0.354	0.389
68	0.100	0.131	0.168	0.204	0.250	0.322	0.353
69	0.114	0.149	0.189	0.229	0.279	0.354	0.389
70	0.127	0.165	0.209	0.253	0.306	0.385	0.424
71	0.113	0.148	0.188	0.228	0.277	0.352	0.387
72	0.109	0.143	0.182	0.221	0.270	0.343	0.377
73	0.074	0.098	0.128	0.157	0.196	0.260	0.285
74	0.051	0.070	0.093	0.116	0.149	0.207	0.225
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement
Public Agency Miscellaneous 2.7%@55

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.004	0.009	0.014	0.035	0.055	0.095	0.100
51	0.002	0.006	0.011	0.030	0.050	0.090	0.094
52	0.006	0.012	0.017	0.038	0.059	0.099	0.105
53	0.010	0.017	0.024	0.046	0.068	0.110	0.117
54	0.032	0.044	0.057	0.085	0.113	0.160	0.173
55	0.076	0.101	0.125	0.165	0.205	0.265	0.289
56	0.055	0.074	0.093	0.127	0.160	0.214	0.233
57	0.050	0.068	0.086	0.118	0.151	0.204	0.222
58	0.055	0.074	0.093	0.127	0.161	0.215	0.234
59	0.061	0.082	0.102	0.138	0.174	0.229	0.250
60	0.069	0.093	0.116	0.154	0.192	0.250	0.273
61	0.086	0.113	0.141	0.183	0.225	0.288	0.315
62	0.105	0.138	0.171	0.218	0.266	0.334	0.367
63	0.103	0.135	0.167	0.215	0.262	0.329	0.361
64	0.109	0.143	0.177	0.226	0.275	0.344	0.378
65	0.134	0.174	0.215	0.270	0.326	0.401	0.442
66	0.147	0.191	0.235	0.294	0.354	0.433	0.477
67	0.121	0.158	0.196	0.248	0.300	0.372	0.409
68	0.113	0.147	0.182	0.232	0.282	0.352	0.387
69	0.117	0.153	0.189	0.240	0.291	0.362	0.398
70	0.141	0.183	0.226	0.283	0.341	0.418	0.461
71	0.111	0.146	0.180	0.229	0.279	0.348	0.383
72	0.076	0.101	0.126	0.166	0.206	0.266	0.291
73	0.105	0.137	0.170	0.218	0.265	0.333	0.366
74	0.145	0.188	0.232	0.290	0.349	0.427	0.471
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement
Public Agency Miscellaneous 3%@60

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.012	0.018	0.024	0.039	0.040	0.091	0.097
51	0.009	0.014	0.019	0.034	0.034	0.084	0.090
52	0.014	0.020	0.026	0.043	0.044	0.096	0.102
53	0.016	0.023	0.031	0.048	0.050	0.102	0.109
54	0.026	0.036	0.045	0.065	0.070	0.125	0.134
55	0.043	0.057	0.072	0.096	0.105	0.165	0.179
56	0.042	0.056	0.070	0.094	0.103	0.162	0.176
57	0.049	0.065	0.082	0.108	0.119	0.180	0.196
58	0.057	0.076	0.094	0.122	0.136	0.199	0.217
59	0.076	0.100	0.123	0.157	0.175	0.244	0.267
60	0.114	0.148	0.182	0.226	0.255	0.334	0.368
61	0.095	0.123	0.152	0.190	0.214	0.288	0.316
62	0.133	0.172	0.211	0.260	0.294	0.378	0.417
63	0.129	0.166	0.204	0.252	0.285	0.368	0.405
64	0.143	0.185	0.226	0.278	0.315	0.401	0.443
65	0.202	0.260	0.318	0.386	0.439	0.542	0.600
66	0.177	0.228	0.279	0.340	0.386	0.482	0.533
67	0.151	0.194	0.238	0.292	0.331	0.420	0.463
68	0.139	0.179	0.220	0.270	0.306	0.391	0.432
69	0.190	0.245	0.299	0.364	0.414	0.513	0.568
70	0.140	0.182	0.223	0.274	0.310	0.396	0.437
71	0.168	0.217	0.265	0.324	0.368	0.461	0.510
72	0.082	0.108	0.133	0.168	0.188	0.258	0.284
73	0.117	0.151	0.186	0.230	0.260	0.340	0.374
74	0.138	0.178	0.218	0.269	0.304	0.389	0.430
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement Public Agency Fire – 2%@55
NO CHANGES BEING PROPOSED

Service Retirement Public Agency Police – 2%@55
NO CHANGES BEING PROPOSED

Service Retirement
Public Agency Fire – 2%@50

	Years of Service						
Attained Age	**5**	**10**	**15**	**20**	**25**	**30**	**35**
50	0.009	0.009	0.009	0.009	0.013	0.020	0.022
51	0.013	0.013	0.013	0.013	0.020	0.029	0.033
52	0.018	0.018	0.018	0.018	0.028	0.042	0.048
53	0.052	0.052	0.052	0.052	0.079	0.119	0.134
54	0.067	0.067	0.067	0.067	0.103	0.154	0.174
55	0.089	0.089	0.089	0.089	0.136	0.204	0.230
56	0.083	0.083	0.083	0.083	0.127	0.190	0.215
57	0.082	0.082	0.082	0.082	0.126	0.189	0.213
58	0.088	0.088	0.088	0.088	0.136	0.204	0.230
59	0.074	0.074	0.074	0.074	0.113	0.170	0.192
60	0.100	0.100	0.100	0.100	0.154	0.230	0.260
61	0.072	0.072	0.072	0.072	0.110	0.165	0.186
62	0.099	0.099	0.099	0.099	0.152	0.228	0.257
63	0.114	0.114	0.114	0.114	0.175	0.262	0.295
64	0.114	0.114	0.114	0.114	0.175	0.262	0.295
65	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement
Public Agency Police – 2%@50

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.005	0.005	0.005	0.005	0.017	0.089	0.098
51	0.005	0.005	0.005	0.005	0.017	0.087	0.096
52	0.018	0.018	0.018	0.018	0.042	0.132	0.150
53	0.044	0.044	0.044	0.044	0.090	0.217	0.250
54	0.065	0.065	0.065	0.065	0.126	0.283	0.328
55	0.086	0.086	0.086	0.086	0.166	0.354	0.412
56	0.067	0.067	0.067	0.067	0.130	0.289	0.336
57	0.066	0.066	0.066	0.066	0.129	0.288	0.334
58	0.066	0.066	0.066	0.066	0.129	0.288	0.334
59	0.139	0.139	0.139	0.139	0.176	0.312	0.362
60	0.123	0.123	0.123	0.123	0.153	0.278	0.322
61	0.110	0.110	0.110	0.110	0.138	0.256	0.295
62	0.130	0.130	0.130	0.130	0.162	0.291	0.337
63	0.130	0.130	0.130	0.130	0.162	0.291	0.337
64	0.130	0.130	0.130	0.130	0.162	0.291	0.337
65	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement
Public Agency Fire – 3%@55

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.001	0.001	0.001	0.006	0.016	0.069	0.069
51	0.002	0.002	0.002	0.006	0.018	0.071	0.071
52	0.012	0.012	0.012	0.021	0.040	0.098	0.098
53	0.032	0.032	0.032	0.049	0.085	0.149	0.149
54	0.057	0.057	0.057	0.087	0.144	0.217	0.217
55	0.073	0.073	0.073	0.109	0.179	0.259	0.259
56	0.064	0.064	0.064	0.097	0.161	0.238	0.238
57	0.063	0.063	0.063	0.095	0.157	0.233	0.233
58	0.065	0.065	0.065	0.099	0.163	0.241	0.241
59	0.088	0.088	0.088	0.131	0.213	0.299	0.299
60	0.105	0.105	0.105	0.155	0.251	0.344	0.344
61	0.118	0.118	0.118	0.175	0.282	0.380	0.380
62	0.087	0.087	0.087	0.128	0.210	0.295	0.295
63	0.067	0.067	0.067	0.100	0.165	0.243	0.243
64	0.067	0.067	0.067	0.100	0.165	0.243	0.243
65	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement
Public Agency Police – 3%@55

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.004	0.004	0.004	0.004	0.015	0.086	0.086
51	0.014	0.014	0.014	0.014	0.034	0.114	0.114
52	0.026	0.026	0.026	0.026	0.060	0.154	0.154
53	0.038	0.038	0.038	0.038	0.083	0.188	0.188
54	0.071	0.071	0.071	0.071	0.151	0.292	0.292
55	0.061	0.061	0.061	0.061	0.131	0.261	0.261
56	0.072	0.072	0.072	0.072	0.153	0.295	0.295
57	0.065	0.065	0.065	0.065	0.140	0.273	0.273
58	0.066	0.066	0.066	0.066	0.142	0.277	0.277
59	0.118	0.118	0.118	0.118	0.247	0.437	0.437
60	0.065	0.065	0.065	0.065	0.138	0.272	0.272
61	0.084	0.084	0.084	0.084	0.178	0.332	0.332
62	0.108	0.108	0.108	0.108	0.226	0.405	0.405
63	0.084	0.084	0.084	0.084	0.178	0.332	0.332
64	0.084	0.084	0.084	0.084	0.178	0.332	0.332
65	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement
Public Agency Fire – 3%@50

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.020	0.020	0.020	0.040	0.130	0.192	0.202
51	0.008	0.008	0.008	0.023	0.107	0.164	0.173
52	0.023	0.023	0.023	0.043	0.136	0.198	0.209
53	0.023	0.023	0.023	0.043	0.135	0.198	0.208
54	0.027	0.027	0.027	0.048	0.143	0.207	0.218
55	0.043	0.043	0.043	0.070	0.174	0.244	0.257
56	0.053	0.053	0.053	0.085	0.196	0.269	0.285
57	0.054	0.054	0.054	0.086	0.197	0.271	0.287
58	0.052	0.052	0.052	0.084	0.193	0.268	0.283
59	0.075	0.075	0.075	0.116	0.239	0.321	0.341
60	0.065	0.065	0.065	0.102	0.219	0.298	0.316
61	0.076	0.076	0.076	0.117	0.241	0.324	0.343
62	0.068	0.068	0.068	0.106	0.224	0.304	0.322
63	0.027	0.027	0.027	0.049	0.143	0.208	0.220
64	0.094	0.094	0.094	0.143	0.277	0.366	0.389
65	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Service Retirement
Public Agency Police – 3%@50

Attained Age	Years of Service						
	5	10	15	20	25	30	35
50	0.050	0.050	0.050	0.099	0.240	0.314	0.379
51	0.034	0.034	0.034	0.072	0.198	0.260	0.312
52	0.033	0.033	0.033	0.071	0.198	0.259	0.311
53	0.039	0.039	0.039	0.080	0.212	0.277	0.333
54	0.045	0.045	0.045	0.092	0.229	0.300	0.361
55	0.052	0.052	0.052	0.105	0.248	0.323	0.389
56	0.042	0.042	0.042	0.087	0.221	0.289	0.347
57	0.043	0.043	0.043	0.088	0.223	0.292	0.351
58	0.054	0.054	0.054	0.109	0.255	0.333	0.401
59	0.054	0.054	0.054	0.108	0.253	0.330	0.398
60	0.060	0.060	0.060	0.121	0.272	0.355	0.428
61	0.048	0.048	0.048	0.098	0.238	0.311	0.375
62	0.061	0.061	0.061	0.122	0.274	0.357	0.431
63	0.057	0.057	0.057	0.115	0.263	0.343	0.414
64	0.069	0.069	0.069	0.137	0.296	0.385	0.466
65	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Non-Work Related Disability

Non-Work Related Disability Retirement							
	Age						
	20	30	40	50	60	70	80
State							
Misc Tier 1 Female	0.00039	0.00046	0.00206	0.00415	0.00256	0.00256	0.00256
Misc Tier 1 Male	0.00019	0.00019	0.00103	0.00274	0.00200	0.00200	0.00200
Misc Tier 2 Female	No Changes being proposed						
Misc Tier 2 Male	No Changes being proposed						
Industrial	No Changes being proposed						
State Safety	No Changes being proposed						
POFF	No Changes being proposed						
CHP	No Changes being proposed						
Schools							
Female	0.00026	0.00016	0.00101	0.00244	0.00139	0.00105	0.00105
Male	0.00028	0.00011	0.00149	0.00388	0.00306	0.00279	0.00279
Public Agency							
Misc Female	0.00010	0.00024	0.00155	0.00229	0.00135	0.00114	0.00118
Misc Male	0.00017	0.00019	0.00122	0.00213	0.00222	0.00180	0.00142
County Peace Officer	No Changes being proposed						
Fire	No Changes being proposed						
Police	No Changes being proposed						

Work Related Disability

Work Related Disability Retirement							
	Age						
	20	30	40	50	60	70	80
State							
State Industrial	No Changes being proposed						
State Safety	0.00002	0.00170	0.00360	0.00557	0.00762	0.00978	0.01205
State POFF	0.00039	0.00167	0.00464	0.01027	0.01966	0.03403	0.05474
State CHP	0.00026	0.00114	0.00337	0.02023	0.34051	0.45918	0.46288
Public Agency							
County Peace Officer	0.00042	0.00249	0.00513	0.00919	0.01740	0.02624	0.07621
Fire	0.00007	0.00074	0.00300	0.02772	0.05833	0.10961	0.18959
Police	0.00000	0.00476	0.01100	0.01846	0.06024	0.08549	0.11161

Termination with Refund

Termination With Refund State Miscellaneous Tier 1
No Changes being proposed

Termination With Refund State Industrial Tier 1
No Changes being proposed

Termination With Refund Schools
No Changes being proposed

Termination With Refund Public Agency Miscellaneous
No Changes being proposed

Termination With Refund Safety Plans
No Changes being proposed

Termination with Vested Benefits

Termination With Vested Benefits State Miscellaneous Tier 1
No Changes being proposed

Termination With Vested Benefits State Industrial Tier 1
No Changes being proposed

Termination With Vested Benefits Schools
No Changes being proposed

Termination With Vested Benefits Public Agency Miscellaneous
No Changes being proposed

Termination With Vested Benefits Safety Plans
No Changes being proposed

Non-Work Related Mortality

Age	Female	Male
20	0.00020	0.00031
25	0.00023	0.00040
30	0.00025	0.00049
35	0.00035	0.00057
40	0.00050	0.00075
45	0.00071	0.00106
50	0.00100	0.00155
55	0.00138	0.00228
60	0.00182	0.00308
65	0.00257	0.00400
70	0.00367	0.00524
75	0.00526	0.00713
80	0.00814	0.00990

Work Related Mortality

No Changes being proposed

Service Retiree and Beneficiary Mortality

Age	Female	Male
20	0.00017	0.00025
25	0.00021	0.00029
30	0.00028	0.00039
35	0.00046	0.00060
40	0.00091	0.00110
45	0.00200	0.00227
50	0.00466	0.00501
55	0.00416	0.00599
60	0.00436	0.00710
65	0.00588	0.00829
70	0.00993	0.01305
75	0.01722	0.02205
80	0.02902	0.03899
85	0.05243	0.06969
90	0.09887	0.12974
95	0.18489	0.22444
100	0.30017	0.32536
105	0.56093	0.58527
110	1.00000	1.00000

Non-Work Related Disability Retiree Mortality

Age	Female	Male
20	0.00372	0.00604
25	0.00392	0.00637
30	0.00428	0.00693
35	0.00492	0.00788
40	0.00605	0.00949
45	0.00804	0.01221
50	0.01158	0.01680
55	0.01149	0.01973
60	0.01235	0.02289
65	0.01607	0.02451
70	0.02211	0.02875
75	0.03037	0.03990
80	0.04725	0.06083
85	0.07762	0.09731
90	0.12890	0.14804
95	0.21746	0.22444
100	0.30017	0.32536
105	0.56093	0.58527
110	1.00000	1.00000

Work Related Disability Retiree Mortality

Age	Female	Male
20	0.00104	0.00135
25	0.00109	0.00141
30	0.00121	0.00153
35	0.00143	0.00178
40	0.00188	0.00225
45	0.00281	0.00318
50	0.00466	0.00501
55	0.00416	0.00599
60	0.00518	0.00754
65	0.00838	0.01122
70	0.01395	0.01635
75	0.02319	0.02834
80	0.03910	0.04899
85	0.06251	0.07679
90	0.09887	0.12974
95	0.18489	0.22444
100	0.30017	0.32536
105	0.56093	0.58527
110	1.00000	1.00000

Salary Increase

The following tables list the proposed Seniority, Merit, and Promotion salary increases added to the current **3.00%** wage inflation assumptions.

Salary Increase State Miscellaneous			
	Entry Age		
Service	**20**	**30**	**40**
0	0.065	0.056	0.043
3	0.045	0.038	0.026
5	0.039	0.032	0.022
10	0.022	0.017	0.011
15	0.013	0.011	0.007
20	0.008	0.007	0.005
25	0.005	0.005	0.004
30	0.005	0.005	0.004

Salary Increase State Industrial			
	Entry Age		
Service	**20**	**30**	**40**
0	0.070	0.070	0.062
3	0.047	0.044	0.036
5	0.040	0.036	0.028
10	0.029	0.023	0.016
15	0.020	0.017	0.013
20	0.014	0.013	0.011
25	0.009	0.009	0.008
30	0.006	0.006	0.006

Salary Increase
State Safety

Service	Entry Age		
	20	30	40
0	0.082	0.070	0.053
3	0.035	0.031	0.026
5	0.021	0.019	0.018
10	0.006	0.006	0.006
15	0.006	0.005	0.004
20	0.006	0.005	0.002
25	0.006	0.005	0.002
30	0.006	0.005	0.002

Salary Increase
State POFF

Service	Entry Age		
	20	30	40
0	0.143	0.152	0.156
3	0.067	0.067	0.064
5	0.045	0.042	0.037
10	0.012	0.010	0.007
15	0.012	0.010	0.007
20	0.012	0.010	0.007
25	0.012	0.010	0.007
30	0.012	0.010	0.007

Salary Increase
CHP

Service	Entry Age		
	20	30	40
0	0.050	0.050	0.050
3	0.035	0.035	0.035
5	0.024	0.024	0.024
10	0.008	0.008	0.008
15	0.008	0.008	0.008
20	0.015	0.015	0.015
25	0.015	0.015	0.015
30	0.008	0.008	0.008

Salary Increase Schools			
	Entry Age		
Service	20	30	40
0	0.060	0.058	0.052
3	0.035	0.033	0.028
5	0.028	0.026	0.021
10	0.016	0.015	0.011
15	0.012	0.011	0.008
20	0.009	0.008	0.005
25	0.007	0.005	0.003
30	0.005	0.003	0.001

Salary Increase Public Agency Miscellaneous			
	Entry Age		
Service	20	30	40
0	0.092	0.086	0.072
3	0.047	0.042	0.033
5	0.034	0.030	0.022
10	0.016	0.013	0.009
15	0.012	0.010	0.006
20	0.009	0.008	0.004
25	0.007	0.006	0.003
30	0.005	0.004	0.002

Salary Increase Public Agency Police			
	Entry Age		
Service	20	30	40
0	0.120	0.117	0.101
3	0.051	0.048	0.040
5	0.031	0.028	0.022
10	0.015	0.013	0.007
15	0.015	0.013	0.007
20	0.015	0.013	0.007
25	0.015	0.013	0.007
30	0.015	0.013	0.007

Salary Increase Public Agency Firefighter			
	Entry Age		
Service	20	30	40
0	0.170	0.168	0.138
3	0.068	0.064	0.051
5	0.039	0.034	0.025
10	0.017	0.016	0.012
15	0.014	0.012	0.009
20	0.012	0.009	0.006
25	0.010	0.007	0.004
30	0.008	0.006	0.004

Salary Increase Public Agency County Peace Officer			
	Entry Age		
Service	20	30	40
0	0.147	0.137	0.120
3	0.060	0.056	0.049
5	0.035	0.032	0.028
10	0.017	0.015	0.011
15	0.016	0.015	0.009
20	0.016	0.015	0.008
25	0.016	0.015	0.008
30	0.016	0.014	0.008