1993-98 Experience Study
For
Iowa Public Employees'
Retirement System
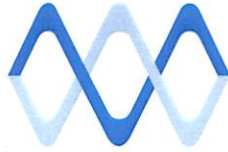
November 12, 1999

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MILLIMAN & ROBERTSON, INC.

Actuaries & Consultants

Internationally WOODROW MILLIMAN

November 12, 1999

Iowa Public Employees' Retirement System
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PO Box 9117
Des Moines, IA 50306

To: Mollie Anderson, Director of the Department of Personnel
        Greg Cusack, Chief Benefits Officer
        Kathy Comito, Chief Investment Officer
        Jennifer Dixon, General Counsel
        Leon Schwartz, Chief Operations Officer

It is a pleasure to submit this report of our investigation of the experience of the Iowa Public Employees' Retirement System for the period beginning March 31, 1993 and ending March 31, 1998.

The results of the experience study are the basis for recommended changes in the actuarial assumptions for the valuation performed as of June 30, 1999.

If you have any questions or need additional information, please call.

Respectfully Submitted,

MILLIMAN & ROBERTSON, INC.

Patrice A. Beckham, F.S.A.   Brent A. Banister, A.S.A.
Consulting Actuary   Actuarial Associate

Enclosure

Section 1

Executive Summary

INTRODUCTION

Actuarial valuations of IPERS are prepared annually to determine whether the statutory employee-employer contribution rate will be sufficient to fund the benefits being credited for membership service and to amortize the System's unfunded actuarial liability within the parameters set out in IPERS funding policy. The valuation requires the use of certain assumptions with respect to the occurrence of future events, such as rates of death, termination of employment, retirement age and salary changes to estimate the obligations (liabilities) of the System.

The basic purpose of an experience study is to determine whether the actuarial assumptions currently in use have accurately predicted actual emerging experience. This information for the current study period, along with results from prior experience studies and information received from System personnel and advisors, is used to evaluate the appropriateness of continued use of the current actuarial assumptions. When analyzing experience and assumptions, it is important to realize that actual experience is reported short term while assumptions are intended to be long term estimates of experience.

At the request of IPERS, Milliman & Robertson, Inc. performed a study of the experience of the Iowa Public Employees' Retirement System during the period from March 31, 1993 through March 31, 1998. For certain assumptions, where there was as critical need for more experience data, experience from 1998-99 was included. This report presents the results and recommendations of our study.

The assumptions presented in this report have been developed in accordance with generally recognized and accepted actuarial principles and practices that are consistent with the applicable Standards of Practice adopted by the Actuarial Standards Board of the American Academy of Actuaries.

SUMMARY OF RECOMMENDED METHODS AND ASSUMPTIONS

The actuarial valuation utilizes two different types of assumptions: economic and demographic. Economic assumptions are related to the general economy and its impact on IPERS. Demographic assumptions are based on the emergence of the specific experience of the individual IPERS members, such as death and retirement.

The set of assumptions recommended in this report are proposed for use in the June 30, 1999 actuarial valuation of the System.

A brief summary of the results of our findings/recommendations is shown below:

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Recommended Changes in Assumptions:

<u>**Economic Assumptions**</u>

Even though there is no change in these assumptions, there are recommended changes in some components of the economic assumptions. The inflation rate is a component of the rate of investment return, payroll growth assumption and salary increase assumption. We are recommending a decrease in the price inflation assumption from 4.0% to 3.5%. However, we recommend the payroll growth assumption remain 4.0%, resulting from the introduction of pure wage inflation component (general wage increases in excess of price inflation, sometimes referred to as productivity).

Although we recommend the current investment return assumption remain at 7.5%, there are significant implications to that recommendation. By leaving the assumption at 7.5% while lowering the inflation assumption to 3.5%, the assumption as to the real rate of return (net of inflation) on investments actually is increased 0.5%. Also, the provision in the law which may transfer a portion of the System's experience gains to the FED reserve account each year will serve to lower the effective rate of return on the assets over the long term. By not decreasing the investment return to reflect this fact, the effective rate of return is increased.

There is no impact on the total salary scale or payroll growth assumption because the general wage increase assumption includes the price inflation assumption of 3.5% and a real wage inflation (productivity) assumption of 0.5%, for a total of 4.0% (which is the current assumption).

<u>**Demographic Assumptions**</u>

- **Change to the 1994 Group Annuity Mortality Table, with adjustments.**

  The current assumption is a unisex table, blended based upon a 60%/40% female/male ratio. Actual retiree deaths during the 1993-98 study period were much lower than anticipated based upon the current assumptions, which indicates a need for revised assumptions. Our recommendation is to use sex distinct tables based upon the 1994 Group Annuity Mortality Table (94 GAM). Experience indicates use of the 94 GAM table with a one-year set forward for males and 95% of the 94 GAM-Female table with a one-year setback is appropriate. This change provides some margin for future improvements in mortality (indicating an expectation that, in the future, retirees will live longer than current retired members).

  The data for deaths among active members is incomplete. As a result, we are recommending the same assumptions be used for active and retired members.

- **Change retirement rates to reflect actual experience.**

  Changes in the provisions for retirement eligibility occurred during the study period (Rule of 92 was lowered to Rule of 90 and then 88), making the analysis of the data more difficult. At the time the Rule of 88 was initiated, an assumption was generated based on current IPERS "Rule of" experience and on the assumptions for similar provisions in other Systems, but no actual experience for IPERS was available upon which to base

the assumption. The underlying data in this Study is the first experience available since the law changed, although the study period is still very limited. Therefore, we relied more heavily on the experience in the recent years of the study period in developing assumptions. These will likely need to continue to be fine-tuned as more experience develops.

Overall, the results of the Study indicate a general trend toward higher utilization of normal retirement prior to age 65 than anticipated under the current assumptions. However, compared to the current assumption, lower early (reduced) retirement rates and retirement rates in the first year of eligibility for unreduced benefits were observed. Our recommended assumptions reflect this trend, as can be seen on the summary on page 5. Due to the critical nature of this assumption and the change in eligibility provisions during and after this study period, we strongly recommend this assumption be closely monitored in the future.

- **Add Disability Rates**

    For the general membership, a specific disability assumption has not been used in the past. Disabled members were included with terminated members for statistical purposes. Although there are not a large number of disabilities that occur each year, the benefits paid to a disabled member are different than those paid to a terminated member and the mortality of such members is also different. With improvements in the data provided by IPERS, we can now identify actual disablement rates.

    Since this is the first experience study to include an analysis of actual disability rates, our recommended assumption follows actual experience very closely. As more experience becomes available in future years, this assumption can be refined.

- **Withdrawal rates based on gender, age and service**

    We are proposing use of duration-based withdrawal rates. The probability of withdrawal (termination of employment) is directly related to the members years of service, as evidenced in the experience study. Taking into account the expected "labor shortage" and the potential impact that it is likely to have on withdrawal rates, we developed a set of service-related withdrawal rates.

- **Probability of withdrawal of account balance by vested members.**

    Many vested members withdraw their contributions after they terminate employment, regardless of whether or not it is in their best financial interests to do so. When vested members withdraw their contribution balance, they forfeit their vested employer benefits. We currently use an assumption as to the election to withdraw/leave their money with the System. However, this is the first time actual experience on withdrawals by vested members has been available. This assumption will undoubtedly be impacted by the change in the law which allows a partial refund of the employer account balance. The magnitude of this impact is unknown since the law is first effective July 1, 1999. Based upon the experience available, input from IPERS management, and taking into account reasonable increases in rates of withdrawal based upon the recent law change, we

developed a table of factors to use in estimating the number of vested members who will withdraw their employee account balance. Close monitoring of this assumption in future years will be very important as actual experience develops under the new law.

- **Use of service/age-based salary assumption**

    When the difference between the actual and assumed price inflation during the study period is considered, actual total salary increases (general wage increase plus merit scale) were close to those expected. Note that since actual wage increases during the period were lower than expected, there were actuarial gains from salary experience during the study period. In an attempt to refine our assumption and, as a result, more accurately value liabilities, we analyzed the data based upon service and age. The results were as might be expected; i.e. salary increases are more dependent upon how long a person has been employed than their age. Salary increases are higher, in general, in the earlier years of employment. We are recommending a set of salary increase assumptions that are dependent both upon age and service.

Summary

The recommendations set out above represent a significant change in the actuarial assumptions. Improvements in computer hardware and software, coupled with improved data from the System, have enabled much more sophisticated analysis of experience than was previously possible. Our recommendations reflect our insights based on the results of this Experience Study, the prior Experience Study, and our knowledge and understanding of the System. We believe that we will be able to more accurately reflect the future liabilities of the System using this set of actuarial assumptions.

The estimated financial impact of these changes, **based on the 1999 actuarial valuation**, is summarized below:

Financial Impact

	Current ($millions)	Proposed ($millions)	Change
Actuarial Liability	$12,467	$13,054	5.0%
Actuarial Value of Assets*	12,890	12,890	0.0%
Unfunded Actuarial Liability*	(423)	164	**
Statutory Contribution Rate	9.45%	9.45%	0.0%
Normal Cost Rate	7.66%	8.79%	14.5%
UAL Payment Rate	1.79%	0.66%	(62.0)%
Amortization Period (years)	0	6.9	**

*Before adjustments for transfer of part of the actuarial gain to the FED. Based upon the 6.9 years to amortize under the proposed assumptions, 25% of the actuarial gain ($227 million) would be transferred to the FED. This would increase the UAL to $390 million and the years to amortize would be 20.2.

**Not appropriate to calculate

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Comparison of Current
And
Proposed Actuarial Assumptions

	Current	Proposed
1. Rate of Investment Return	7.5%	7.5%
2. Payroll Growth	4.0%	4.0%
3. Inflation Rate	4.0%	3.5%

4. Rates of Mortality

	Current	Proposed
Retired Members:	1977 IPERS Unisex Mortality Table	1994 Group Annuity Mortality Table set forward 1 year for males and set back 1 year for females (after reducing rates by 5%)
Active Members:	1983 Group Annuity Mortality Table (60% F / 40% M)	Same as Retired Members
Protection Occupation:	1977 IPERS Unisex Mortality Table set forward 3 years	1983 Group Annuity Mortality Table

5. Rates of Salary Increases (% at Selected Ages)

Age	Annual Increase	Age	Years of Service								
			1	2	3	4-5	6-7	8-10	11-15	16-20	20+
22	10.0%	22	18.5%	12.5%	8.5%	8.0%	7.5%				
27	8.1%	27	15.5%	15.0%	8.3%	7.0%	6.5%				
32	7.1%	32	14.8%	9.8%	8.0%	7.0%	6.5%	6.0%			
37	6.4%	37	14.7%	9.8%	8.0%	7.0%	6.3%	6.0%	5.5%		
42	6.1%	42	14.7%	9.2%	8.0%	7.0%	6.2%	6.0%	5.5%	4.9%	4.9%
47	5.7%	47	14.2%	9.0%	8.0%	7.0%	6.2%	5.5%	5.2%	4.8%	4.2%
52	5.5%	52	13.3%	8.3%	6.9%	7.0%	6.2%	5.5%	5.0%	4.5%	4.2%
57	5.1%	57	12.5%	7.7%	6.9%	7.0%	5.7%	5.5%	4.6%	4.5%	4.2%
62	4.5%	62	10.9%	7.1%	6.7%	6.0%	4.5%	4.5%	4.5%	4.5%	4.0%

	Current	Proposed
Protection Occupation:	Same as General Members	Same as General Members

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Current

Proposed

6. Rates of Termination of Employment

Age	Rates
22	29.10%
27	14.75%
32	10.96%
37	8.57%
42	7.18%
47	6.34%
52	5.16%

Male – Based on Years of Service

Age	0-1	2	3	4-6	7-9	10+
22	33.0%	27.2%	22.0%			
27	23.2%	16.5%	12.1%	10.0%		
32	19.8%	16.5%	11.0%	7.5%	5.5%	3.9%
37	19.6%	16.0%	11.0%	7.5%	5.0%	3.3%
42	19.6%	14.3%	11.0%	7.5%	5.0%	2.5%
47	19.6%	14.3%	9.9%	7.5%	5.0%	2.0%
52	17.6%	11.0%	7.7%	7.5%	5.0%	2.0%

Female – Based on Years of Service

Age	0-1	2	3	4-6	7-9	10+
22	33.0%	30.8%	22.0%			
27	27.5%	22.0%	16.9%	11.0%		
32	24.8%	22.0%	15.4%	10.5%	7.2%	5.0%
37	19.8%	16.0%	14.3%	10.5%	6.6%	3.6%
42	19.8%	15.7%	12.1%	8.8%	6.1%	3.1%
47	19.8%	14.3%	12.1%	8.3%	5.0%	2.5%
52	19.8%	14.3%	12.1%	8.3%	5.0%	2.5%

Protection Occupation:

Age	Rate
22	21.8%
27	11.1%
32	8.2%
37	6.4%
42	5.4%
47	4.8%
52	3.9%

Age	Rate
22	10.0%
27	6.0%
32	3.5%
37	2.7%
42	2.5%
47	2.2%
52	2.2%

Current

Proposed

7. Rates of Disability

General Membership: None

	Rates	
Age	**Male**	**Female**
22	.02%	.02%
27	.02%	.02%
32	.02%	.02%
37	.04%	.03%
42	.07%	.05%
47	.14%	.09%
52	.33%	.22%
57	.63%	.39%
62	.90%	.62%

Protection Occupation:

Age	**Rate**
22	.12%
27	.12%
32	.12%
37	.18%
42	.29%
47	.44%
52	.75%

Age	**Rate**
22	.12%
27	.12%
32	.12%
37	.14%
42	.19%
47	.39%
52	.64%

8. Disabled Mortality   None

The probability of death in any year is the healthy member mortality (ignoring set forward or set back) plus 2.5%, but not less than 3.0%.

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9. Retirement Rates

Current

Early

Age	Rate
55	5%
58	8%
60	10%
62	35%
64	20%

All Unreduced Retirement

Age	1st Eligible	After 1st Eligible
55-59	25%	10%
60	40%	15%
61	40%	20%
62	50%	35%
63	50%	20%
64	50%	20%
65	50%	50%
66-68	30%	30%
69	45%	45%
70	100%	100%

Proposed

Early

Age	Rate
55	5%
58	5%
60	10%
62	25%
64	20%

All Unreduced Retirement

Age	1st Eligible	After 1st Eligible
55	20%	N/A
57	20%	20%
59	20%	20%
61	35%	35%
63	35%	40%
65	30%	50%
67	15%	20%
69	15%	25%
70	100%	100%

Terminated Vested Members: Age 63   Age 62

Protection Occupation:

Age	Rate		Age	Rate
55	25%		55	20%
57	25%		57	16%
59	25%		59	16%
61	30%		61	20%
63	40%		63	25%
65	100%		65	100%

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10. Refund to Vested Members

	Current
Age	**Rate**
25	100%
30	90%
35	80%
40	60%
45	50%
50	0%
55	0%

	Proposed	
Age	**Male**	**Female**
25	100%	100%
30	90%	80%
35	80%	70%
40	60%	45%
45	30%	15%
50	15%	15%
55	0%	0%

Protection Occupation: None

Age	**Male**	**Female**
25	80%	70%
30	60%	45%
35	30%	15%
40	15%	15%
45	0%	0%

Section 2

ECONOMIC ASSUMPTIONS

Since the last experience study was performed for IPERS, the Actuarial Standards Board has adopted Actuarial Standard of Practice (ASOP) NO. 27, *Selection of Economic Assumptions for Measuring Pension Obligations.* This standard provides guidance to actuaries giving advice on the selection of economic assumptions for measuring obligations under defined benefit plans, such as IPERS. ASOP No. 27 is effective for any valuation with a measurement date on or after July 15, 1997.

Because no one knows what the future holds, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes. These estimates are based on a mixture of past experience, future expectations, and professional judgment. The actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data. However, the standard explicitly advises the actuary not to give undue weight to recent experience.

Recognizing that there is not one "right answer", the standard calls for the actuary to develop a best estimate range for each economic assumption, and then recommend a specific point within that range. Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with all other economic assumptions over the measurement period.

In our opinion, the economic assumptions recommended in this report have been developed in accordance with ASOP No. 27. The following table shows our recommendations. Detailed discussion on each assumption follows:

	Current Assumptions	Recommended Assumptions
A. Consumer Price Inflation	4.0%	3.5%
B. Investment Return	7.5%	7.5%
C. Payroll Growth	4.0%	4.0%

CONSUMER PRICE INFLATION

Use in the Valuation: Future price inflation has an indirect impact on the results of the actuarial valuation through the development of the assumptions for investment return, payroll growth, and salary scale.

The current assumption for price inflation is 4.0% per year.

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Historical Perspective: We have used certain economic statistics that have been accumulated on a monthly basis from 1926 through 1999 and published by the Bureau of Labor and Statistics. The inflation data is based on the national Consumer Price Index, US City Average, All Urban Consumers (CPI). The compounded annual inflation rate for the period from June 1926 through June 1999 is 3.12%.

There are numerous ways to review this data with significantly varying results. The tables below show the compounded annual inflation rate for various ten-year periods and for longer periods ended in June of 1999.

Decade	CPI		Period	CPI
1949-59	1.99%		1926-99	3.12%
1959-69	2.32%		1949-99	3.95%
1969-79	7.04%		1959-99	4.45%
1979-89	5.55%		1969-99	5.17%
1989-99	2.96%		1979-99	4.25%
			1989-99	2.96%

Historically, a somewhat different picture is seen by splitting the period into several segments. For example, the CPI for June of 1944 was 52.6 compared to 53.0 in June of 1926. Although there was some modest inflation during this period, there were also years of deflation. Over this entire 18 year period, inflation was essentially 0%.

The compounded annual rate of inflation between 1944 and 1999 was 4.17% per year. Over the last fifteen years, the annual rate has come down to 3.19%, which is closer to the historical average. However, the previous fifteen-year period included a few years of unusually high inflation in the 1970's, resulting is a significantly higher average for that period.

Period	CPI
1926-44	0.0%
1944-99	4.17%
1969-84	7.19%
1984-99	3.19%

Forecasts of Inflation: Since the U.S. Treasury started issuing inflation indexed bonds, it is possible to determine the approximate rate of inflation anticipated by investors by comparing the yields on inflation indexed bonds with traditional fixed government bonds. Current market prices suggest investors expect inflation to be about 3% over the next five to ten years.

However, since the time horizon used in valuing retirement benefits is much longer than the ten years or so covered by most economists' forecasts, it is appropriate to consider a longer term for this purpose.

Reasonable Range and Recommendations: We believe that a range between 3.0% and 4.25% is reasonable for an actuarial valuation of a retirement system. We recommend that the long-term assumed price inflation rate be lowered from 4.0% to 3.5% per year.

Consumer Price Inflation	
Current Assumption	4.00%
Reasonable Range	3.00% - 4.25%
Recommended Assumption	3.50%

INVESTMENT RETURN

Use In The Valuation: The investment return assumption is one of the primary determinants in the allocation of the expected cost of the System's benefits, providing a discount of the estimated future benefit payments to reflect the time value of money. The valuation interest rate should represent the long-term rate of return on the actuarial valuation of assets, considering the fund's asset allocation policy, expected long term real rates of return on the specific asset classes, the underlying inflation rate, and investment and administrative expenses.

The current assumption for investment return is 7.5% per year, net of all investment-related and administrative expenses.

Investment-Related And Administrative Expenses

The investment return is assumed to be net of all investment-related and administrative expenses. The table below shows the ratio of investment and administrative expenses to assets over the last five years. The expense ratio is calculated as the total expenses divided by the beginning asset balances.

FYE	Expenses		Actl Value Assets	Expense Rate		
	Invest.	Admin.		Invest	Admin.	Total
1998	$20.3	$4.01	$11,352	.18%	.04%	.22%
1997	17.4	3.83	10,113	.17	.04	.21
1996	14.5	3.41	8,975	.16	.04	.20
1995	14.1	3.25	7,574	.19	.04	.23
1994	17.1	3.85	6,926	.25	.06	.31
1993	15.8	3.76	6,365	.25	.06	.31
All numbers shown are millions.						

Based on this data, it appears reasonable to expect the investment and administrative expenses to represent no more than 0.30% of the Systems' assets.

Net Rate of Investment Return

The historical actual and expected return on the actuarial and market value of assets is shown below. Information is provided for longer than the study period to provide more data for analysis. The asset smoothing methodology was changed in 1996 to comply with new Governmental Accounting Standards.

Fiscal Year End	Assumed Rate of Return	Actual Rate of Return*	Actual Return on Market
1998	7.50%	14.6%	18.2%
1997	7.50%	12.8%	20.5%
1996	6.75%	9.2%	16.9%
1995	6.75%	8.9%	14.8%
1994	6.75%	8.5%	2.8%
1993	6.50%	8.5%	10.3%
1992	6.50%	8.6%	9.5%
1991	6.50%	8.6%	8.4%
1990	6.50%	8.9%	8.4%
1989	6.50%	9.6%	13.9%
1988	6.50%	10.9%	5.5%
1987	6.50%	7.3%	11.5%
1986	6.50%	16.7%	25.1%
1985	6.50%	11.2%	28.2%

*As measured on actuarial value of assets

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In July, 1998, the IPERS Investment Board adopted a new asset allocation. Based on that asset allocation, which we understand is still in place and expected real rates of return set out by Wilshire Associates, the following analysis of the expected return is developed.

Asset Class	Expected Real Rate of Return	Target Asset Allocation	Component of Return
Domestic Equity	6.75	28%	1.89%
International Equity	6.75	13%	.88%
Emerging Markets	8.25	2%	.17%
Real Estate	6.00	5%	.30%
Private Equity/Debt	11.75	10%	1.18%
Global Fixed Income	3.75	34%	1.27%
High Yield Fixed Income	5.75	3%	.17%
Tactical Asset Allocation	6.30	5%	.31%
Expected Real Return			6.17%
Inflation			3.50%
Nominal Return			9.67%
Expenses			(0.30)%
Total Expected Return, Net of Expenses			9.37%

Although this approach develops an expected return, it ignores the potential for volatility in results especially over the long term. A more sophisticated approach may be used based on stochastic modeling of future returns, which incorporates expected returns, standard deviations, and correlation between asset classes. This type of modeling is beyond the scope of this experience study.

Another consideration in the development of the long term investment return assumption for IPERS is the provision in the law which may transfer a portion of the System's experience gains to the FED account each year. This gain is removed from the Retirement System's general assets and cannot be retrieved in future years. Because the rate of investment return on the fund may **average** 7.5% but the actual returns **each** year will be higher or lower than 7.5%, the FED serves to effectively lower the rate of return on the fund.

To illustrate this in a very simplified way, assume the only favorable/unfavorable experience for the System is from the investment return. Furthermore, assume the portion of the favorable experience that goes to the FED is always 25% (this is hypothetical for illustration purposes only). The following chart illustrates the impact of the FED on the investment return assumption.

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Year	Investment Return	Portion to FED	Effective Rate for Fund
1	10.50%	.75%	9.75%
2	4.50%	.00%	4.50%
3	10.50%	.75%	9.75%
4	4.50%	.00%	4.50%
5	10.50%	.75%	9.75%
6	4.50%	.00%	4.50%
7	10.50%	.75%	9.75%
8	4.50%	.00%	4.50%
9	10.50%	.75%	9.75%
10	4.90%	.00%	4.90%
Avg.	7.50%		7.10%

The transfer of favorable investment returns to the FED will tend to lower the effective rate of return on the System's assets over the long term, although it is difficult to quantify its impact.

Reasonable Range and Recommendation: The setting of the investment return assumption is more of a subjective than an objective process. The intuition and "gut feel" of both the actuary and the investment staff must be factored into the analysis. Most economists believe that recent investment experience is not likely to be repeated. There is much uncertainty and diverse opinion as to future expectations of the capital markets. In addition, the impact of the FED on the funding of the Retirement System must be factored into setting the assumption. Based on the fact the investment return assumption is a very long term assumption (i.e. 50-70 years), we feel a reasonable range for the investment return, gross of expenses, based on the current asset allocation is from 6.75% to 8.25%. This range needs to be lowered to reflect the expenses assumed to be paid from the investment return. Given an assumed expense ratio of 30 basis points, we believe that a range between 6.45% and 7.95% is reasonable for an actuarial valuation of a retirement system with the current IPERS asset allocation policy and the provision in the law for the transfer of favorable experience to the FED. Due to the extremely long nature of the liabilities being discounted, we recommend the investment return of 7.5%, net of expenses, be retained.

Investment Return	
Current Assumption	7.50%
Reasonable Range	6.45% - 7.95%
Recommended Assumption	7.50%

PAYROLL GROWTH

Use in the Valuation: In the actuarial valuation process, the difference between the statutory contribution rate of 9.45% and the normal cost rate is used to finance (or pay off) the unfunded actuarial liability. The amortization payment is determined as a level percent of the total payroll of the system, so a payroll growth assumption is necessary to project future total system payroll.

The current payroll growth assumption is equal to the inflation rate, i.e. 4.0%. The payroll growth assumption refers to the increase in the total covered payroll of the System, not the increases for individual members. To the extent the size of the membership remains relatively stable, the covered payroll of the System will increase at the general wage increase assumption. This occurs because each year some members retire, quit or die and are replaced by new members, usually at a lower salary level. Concurrently, the members that remain get salary increases (including merit increases). The net impact on covered payroll of this changing group is what we are trying to project with this assumption.

Estimates of future salaries are based on two types of assumptions:

1)   Rate of increase in individual salaries due to promotion and longevity which occur even in the absence of inflation; and

2)   Rates of increase in the general wage levels of the membership, which are directly related to the economy, and inflation in particular.

The assumptions with respect to the first of these elements (merit scale) are demographic assumptions, set based on predictions of the experience of the members of the System. The assumed general wage increase is considered an economic assumption.

The wages being projected are those to be paid to public employees in Iowa. However, future general wage increases will be decided more by experience in the nation as a whole, rather than in Iowa. Economic developments (such as the rate of inflation) are not going to be slowed or accelerated to any significant degree because of Iowa experience alone. As an example, budgetary restrictions might cause the salaries of public employees in Iowa to grow at a slower rate for a period of time than the salaries of counterparts in the private sector with comparable education and training. However, there is a limit on how far apart salaries might become for reasonably comparable positions. Thus, if the variation between the salary of a public employee and a comparable position in private employment becomes too great, the public employers will simply be unable to hire any qualified employees.

We can't judge whether public employee salaries at any time will be greater or less than those comparable positions in the private sector. Variations between the sectors can be absorbed as actuarial gains or losses in the future. We propose to assume that all salaries (Iowa public employees and all others) will be subject to the same underlying forces because of inflation.

16

Historical Perspective: We have used statistics from the OASDI on the average national wage to illustrate annual increases in the general wage. This data shows a compounded annual increase from 1926 through 1997 of 4.59%.

There are numerous ways to review this data. For consistency with our observations of other indices, the table below shows the compounded annual rates of wage growth for various ten-year periods, and for longer periods ended December of 1997 (most recent data available).

Decade	Total Wage Increase	Price Inflation	Real Wage Growth
1947-57	5.14%	1.96%	3.18%
1957-67	3.65%	1.78%	1.87%
1967-77	6.49%	6.24%	0.25%
1977-87	6.54%	6.39%	0.15%
1987-97	4.06%	3.41%	0.65%

Period	Total Wage Increase	Price Inflation	Real Wage Growth
1926-97	4.59%	3.24%	1.35%
1947-57	5.17%	3.93%	1.24%
1957-67	5.18%	4.43%	0.75%
1967-77	5.69%	5.34%	0.35%
1977-87	5.29%	4.89%	0.40%
1987-97	4.06%	3.41%	0.65%

Historically, general wage increases have exceeded price inflation, although the difference has generally decreased.

Reasonable Range and Recommendations: Based on our judgment, we believe that a range between 3.0% and 5.0% for general wage increases, and therefore payroll growth, is reasonable for the actuarial valuation. We recommend that the general wage increase be set to 4.0% per year, composed of a price inflation rate of 3.5% and a real wage growth assumption component of 0.5% per year. This results in a payroll growth assumption of 4.0%.

Payroll Growth	
Current Assumption	4.0%
Reasonable Range	3.0% - 5.0%
Recommended Assumption	4.0%

Section 3

Introduction to Demographic Assumptions

The purpose of a study of demographic experience is to compare what actually happened to the individual members during the study period (March 31, 1993 through March 31, 1998) with what was expected to happen based on the actuarial assumptions.

Studies of demographic experience involve several steps:

- First, the number of members changing membership status, called decrements, during the study are tabulated by age, duration, sex, group, and membership class (active, retired, etc.).

- Next, the number of members expected to change status is calculated by multiplying certain membership statistics, called the exposure, by the expected rates of decrement.

- Then, the number of actual decrements are compared with the number of expected decrements. The comparison is called the actual to expected ratio (A/E Ratio), and is expressed as a percentage.

If the actual experience differs significantly from the overall expected results, or if the pattern of actual decrements, or rates of decrement, by age, sex, or duration does not follow the expected pattern, new assumptions may be considered. Recommended revisions to current assumptions may not be an exact representation of the experience during the observation period. Judgment is required to predict future experience from past trends and current evidence, including a determination of the amount of weight to assign to the most recent experience.

Revised assumptions are tested by using them to recalculate the expected number of decrements during the study period, and the results are shown as revised A/E Ratios.

The remainder of this report presents the results of the study of demographic assumptions. We have generally prepared tables that show a comparison of the actual and expected decrements over the study period and the overall ratio of actual to expected results under the current assumptions. If a change is being proposed, the revised A/E Ratios are shown as well.

Salary adjustments, other than the economic assumption for wage inflation, are treated as demographic assumptions. However, a different method of investigation is needed for salaries than is used for the decrements. These adjustments have been analyzed with historical data as described later in this section.

Section 4

SALARY ADJUSTMENTS

Estimates of future salaries are based on assumptions for two types of increases:

1. Increases in each individual's salary due to promotion or longevity (often called merit increases), and

2. Increases in the general wages of the membership which are directly related inflation.

In the economic assumptions section of this report, we recommended that the second of these rates, general wage increases, be set at 4.0% (3.5% price inflation and 0.5% real wage growth).

Although future salary increases are the result of two components, it is difficult, if not impossible, to isolate the true salary adjustment due to wage inflation given the number of different employers in IPERS and potential varying conditions for each employer. Therefore, the experience study reviewed total salary increases for the period and assumed the difference between actual salary increases and wage inflation during the study period represents the merit scale.

In our study, we compared individual salary increases for all members active in any two consecutive periods (e.g. 1993 and 1994, 1994 and 1995, etc.). The salary data provided changed significantly in 1995, which distorted the experience from 1994-1995. This was taken into account in our analysis. An addition, salary experience from 1998 to 1999 was included as it was readily available and provided another year of data, reported on a consistent basis.

The results of the experience study are shown below:

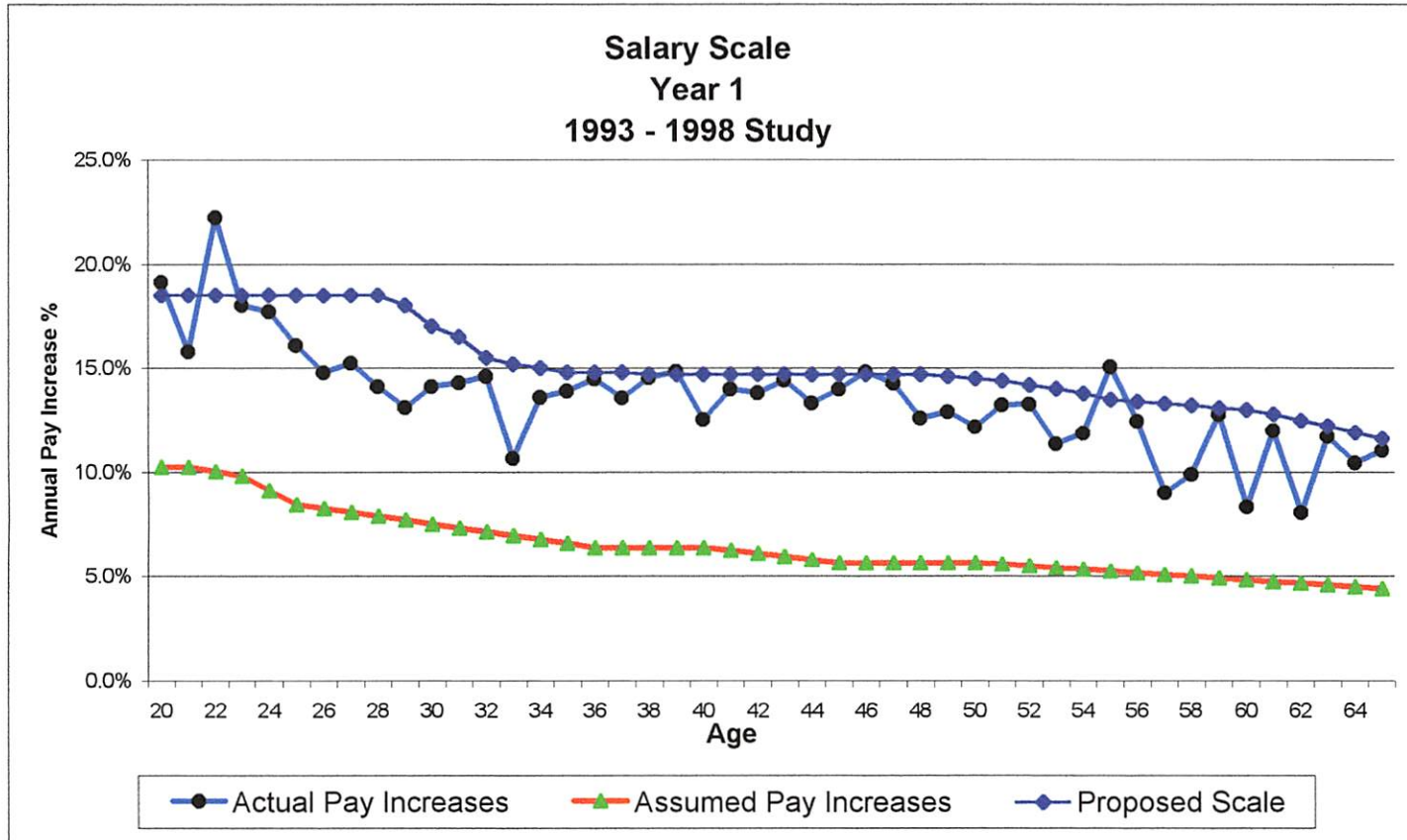| Group	Average Increase 1993-1999	
	Actual	**Expected**
Total IPERS	5.4%	6.0%
General Wage Increase	3.5%	4.0%
Merit Increase	1.9%	2.0%

The actual total salary increase during the period studied was 5.4%. General wage increases during the period 1993-1999 were 3.5%, resulting in an average merit scale of 1.9%. This was very close to the current average merit increase of 2%. However, further analysis raised some other issues and a possible improvement in the methodology to predict future salary increases.

In reviewing the salary experience during the study period we analyzed results based on gender, service and age. Differences by gender were not significant but differences in salary increases by years of service were quite different, as might be expected. Increases tend to be much higher in the initial years of employment, with significant decreases as employment extends. There is also some difference in the salary increase rates based on age (younger members with the same service tend to get higher increases). After reviewing the experience in varying ways, we are recommending the adoption of a merit scale, which varies by age and service. See the chart on page 5 for a description of the salary increase assumption.

We feel this approach provides a better estimate of projected salaries and therefore projected benefits. As a result, the System's liabilities should be more accurately reflected.
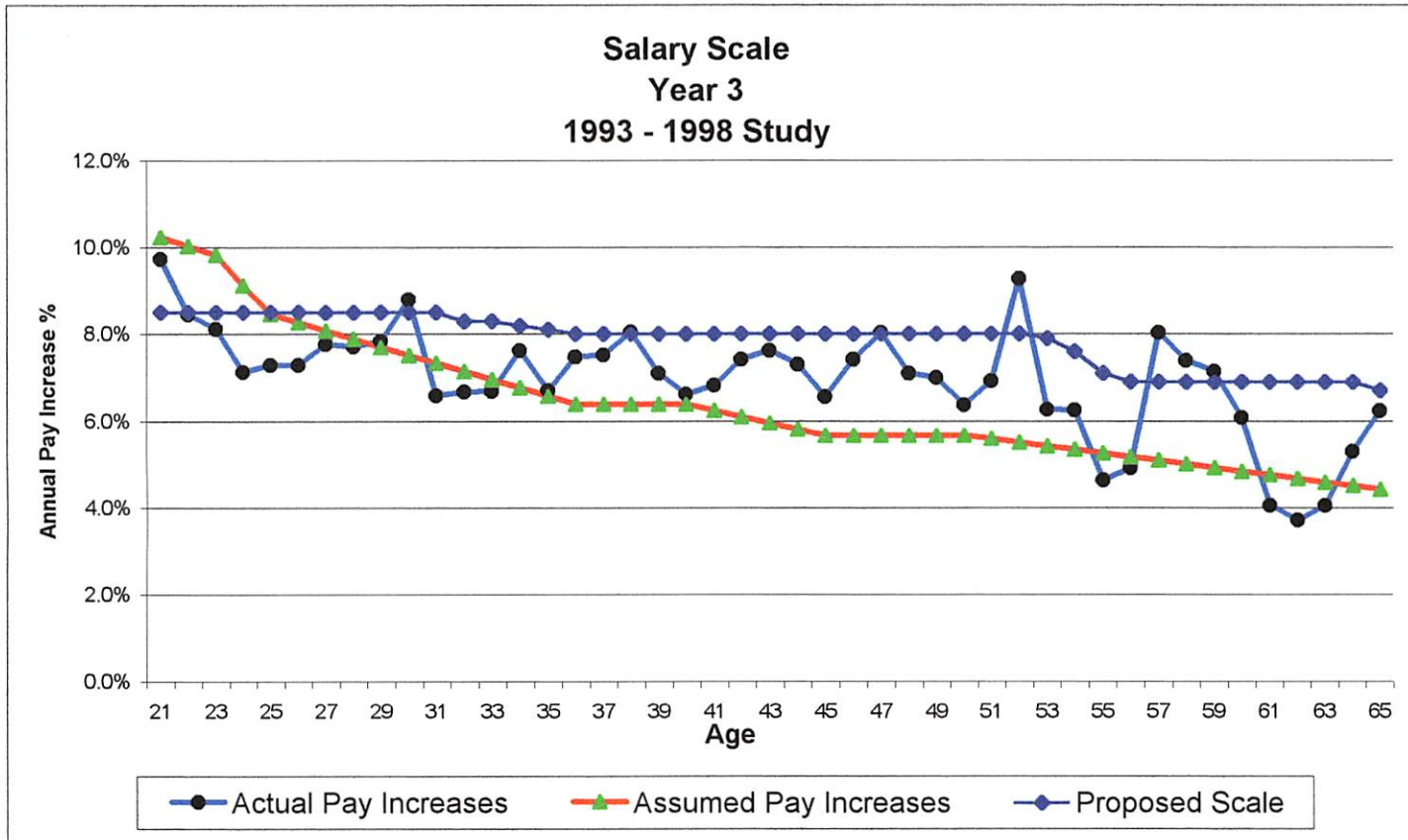
Graph 1

Salary Scale
Year 1
1993 - 1998 Study

Legend: Actual Pay Increases — Assumed Pay Increases — Proposed Scale

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Salary Increases	14.3%	7.0%	16.0%

Graph 2
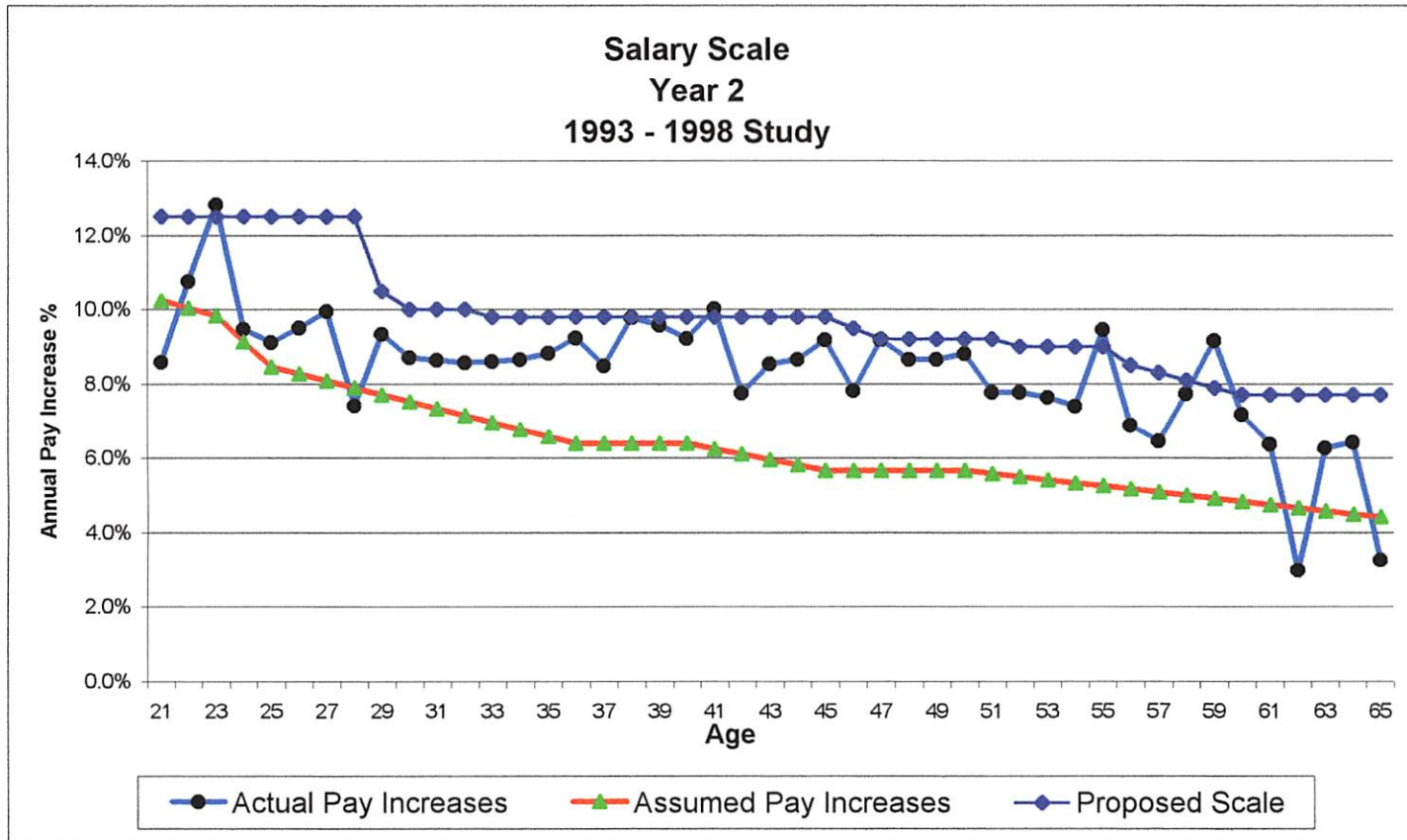
Salary Scale
Year 2
1993 - 1998 Study

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Salary Increases	8.9%	6.8%	10.4%

Graph 3

Salary Scale
Year 3
1993 - 1998 Study

Legend: Actual Pay Increases — Assumed Pay Increases — Proposed Scale

X-axis: Age

Y-axis: Annual Pay Increase %

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Salary Increases	7.2%	6.7%	8.1%

Graph 4
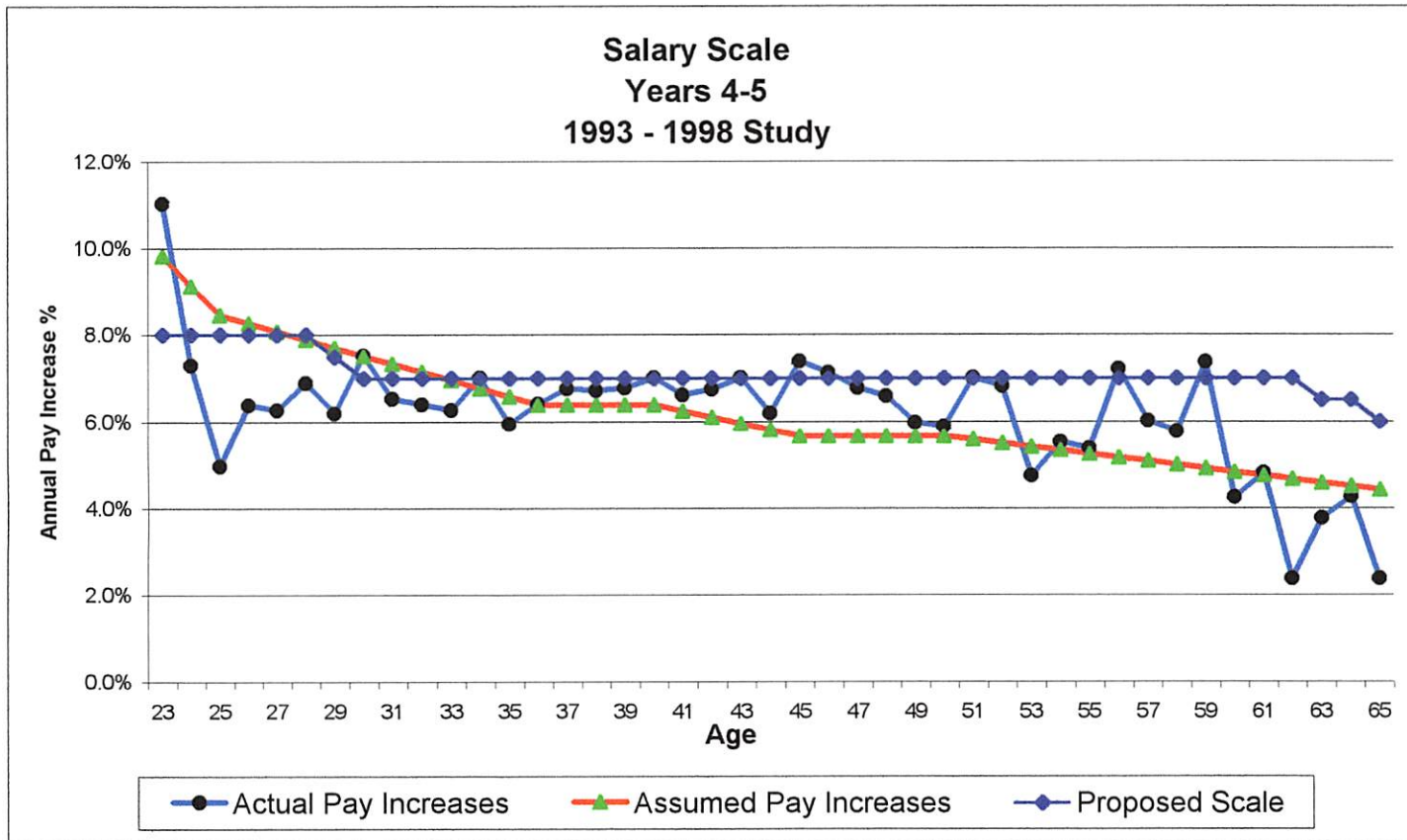
Salary Scale
Years 4-5
1993 - 1998 Study

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Salary Increases	6.5%	6.5%	7.2%

Graph 5
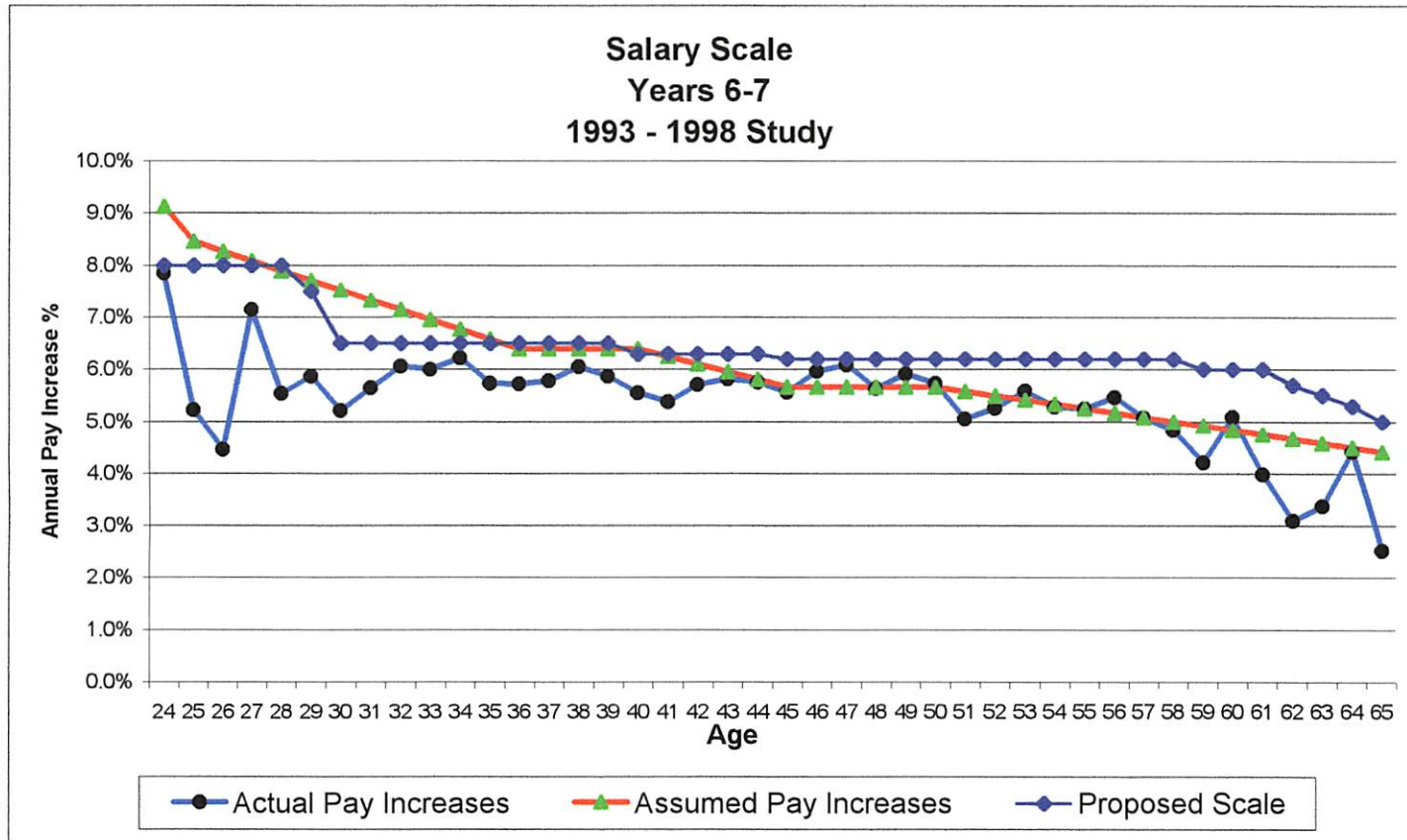
Salary Scale
Years 6-7
1993 - 1998 Study

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Salary Increases	5.6%	6.3%	6.4%

Graph 6
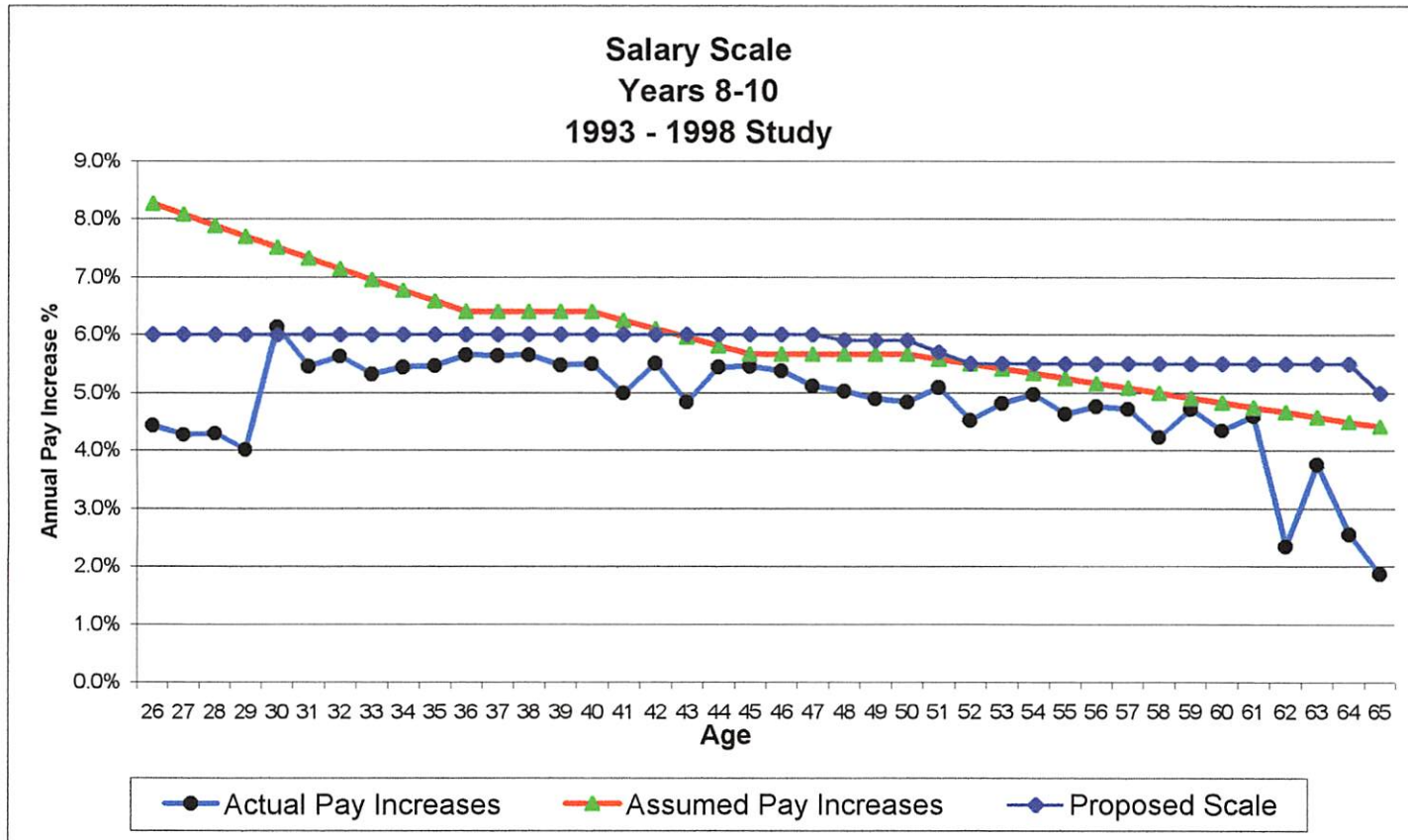
**Salary Scale
Years 8-10
1993 - 1998 Study**

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Salary Increases	5.2%	6.1%	5.9%

Graph 7
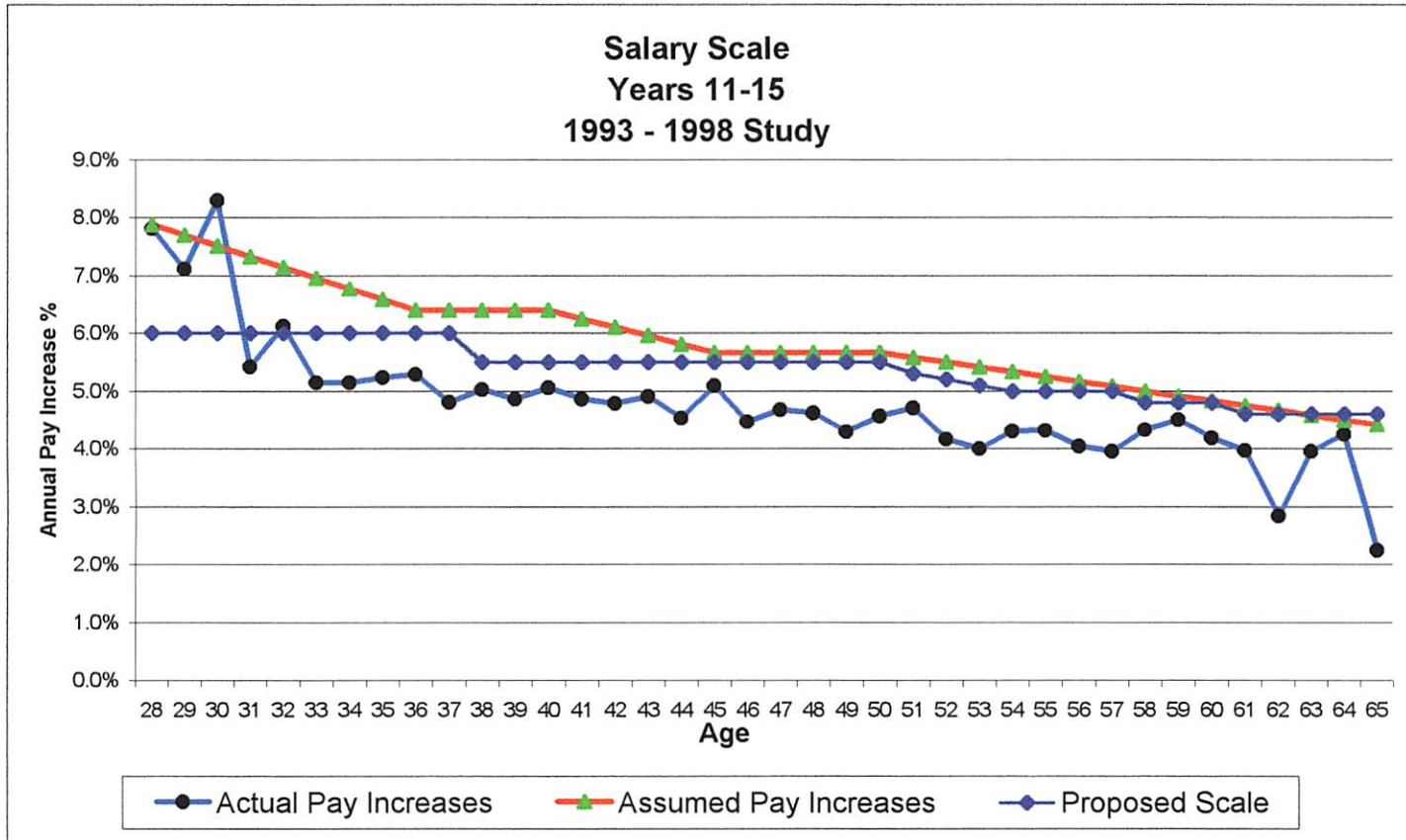
Salary Scale
Years 11-15
1993 - 1998 Study

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Salary Increases	4.7%	5.9%	5.5%

Graph 8
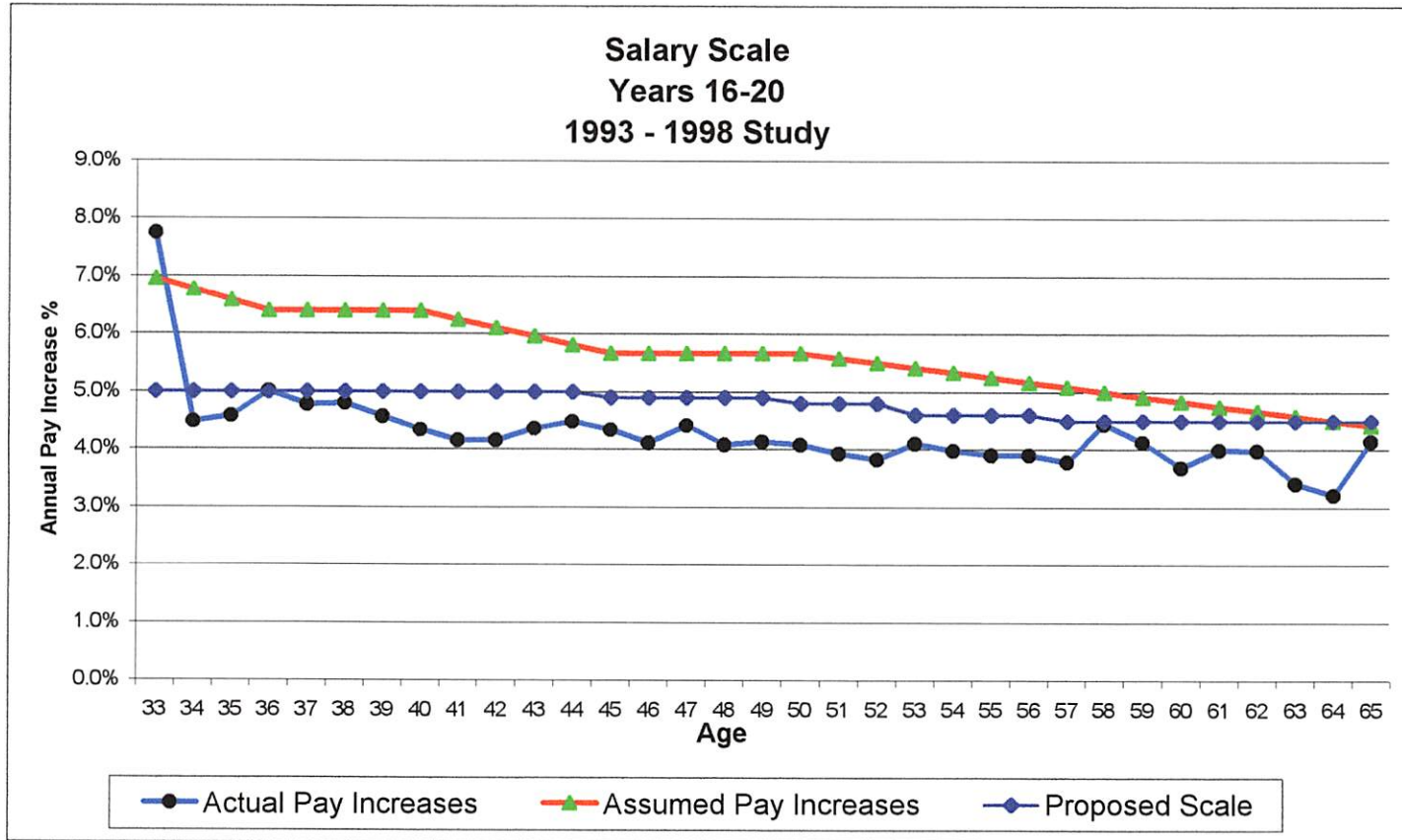
Salary Scale
Years 16-20
1993 - 1998 Study

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Salary Increases	4.2%	5.8%	4.9%

Graph 9
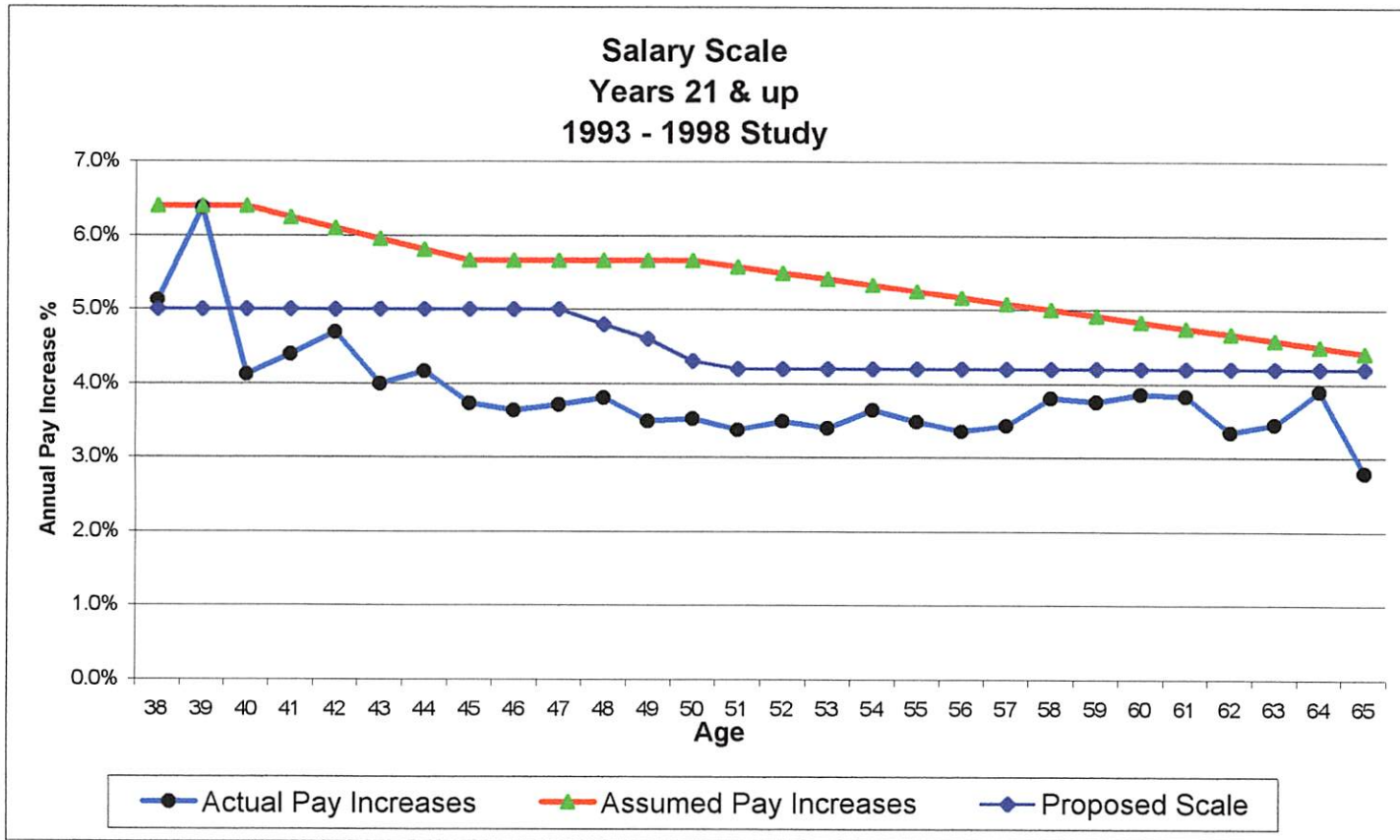
Salary Scale
Years 21 & up
1993 - 1998 Study

Legend: Actual Pay Increases, Assumed Pay Increases, Proposed Scale

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Salary Increases	3.6%	5.4%	4.5%

Section 5

MORTALITY

One of the most important demographic assumptions is mortality because this assumption predicts when retirement payments will stop. The life expectancies of current and future retirees are predicated on the assumed rates of mortality at each age. It is commonly known that rates of mortality have been declining throughout this century, which means people, in general, are living longer.

Because of potential differences in mortality, we studied healthy retirees, disabled retirees and active members separately.

Healthy Retirees: The valuation currently uses separate mortality assumptions for active and retired member mortality both which are unisex tables (same assumption is applied to male and female members). Mortality for active and vested members is based on the 1983 Group Annuity Mortality Table with a blend of 60% female mortality and 40% male mortality. Retired member mortality is based on a table developed from IPERS own experience.

In examining results, if the A/E Ratio is greater than 100% we have predicted fewer deaths than actually occurred, and therefore have built in some "margin" for future mortality improvements. This is generally considered a prudent approach, as future mortality improvements are still expected to occur. The observed A/E Ratios for healthy retirees are shown in the following chart.

	1993-98		
Year	**Observations**		**A/E Ratio**
	Actual	**Expected**	
1993	1,541	1,802	86%
1994	1,489	1,852	80%
1995	1,764	1,915	92%
1996	1,718	1,958	88%
1997	1,700	1,997	85%
1998	1,941	2,052	95%
Totals	**10,153**	**11,576**	**88%**

Although the overall experience from the prior experience study (1982-92) indicated a close fit to the current assumption, there was a trend in the last 4 years (1988-92) of that study which indicated actual mortality rates were lower than assumed. The A/E ratio during that period was 95%. Based on the results of this study, it is clear that fewer deaths than expected are occurring (which, in general, results in actuarial losses). Furthermore, no margin exists for future mortality improvements. We feel a change in the mortality assumption for retired lives is appropriate.

In the past a "unisex" mortality table has been used, developed based on the relative proportion of the overall population that is male and female at the time of the study. As long as the composition of the population with respect to males and females remains the same, this methodology should produce liability results which are comparable to those which would result from the use of sex-distinct rates. However, it is a less direct method of determining liabilities. If the male/female composition of the population changes, this methodology does not automatically reflect those changes in the valuation. It would require analysis and a change when the next experience study is performed.

Since there is clearly a need to change the mortality assumption for retired members at this time, we recommend adopting sex distinct mortality rates. This provides a more direct calculation of each member's liability and provides more assurance that as the composition of the group or the respective benefit levels for males/female change, the changes will be automatically and accurately reflected in each year's actuarial valuation.

The most recent mortality table published by the Society of Actuaries (SOA) is the 1994 Group Annuity Mortality Table. This table reflects overall improvement in mortality from the prior SOA Table, the 1983 Group Annuity Mortality Table. However, there are greater improvements in male mortality than female. We recommend the 1994 Group Annuity Mortality Table be adopted with the following adjustments: one year set forward for males and 95% of the mortality rates with a one year setback for females.

	Observations 1993-98		A/E Ratio	
	Actual	**Expected**	**Current**	**Proposed**
Male	5,154	3,989	129%	104%
Female	4,999	7,587	66%	105%
Totals	**10,153**	**11,576**	**88%**	**105%**

Beneficiaries: The mortality of beneficiaries applies to the survivors of members who have elected a joint and survivor option. There is never complete data on the mortality experience of beneficiaries prior to the death of the member, because there is no requirement that the death be reported to the System. Therefore, the mortality of beneficiaries is, by convention, set equal to the mortality of retired members.

Disabled Members: Currently a different mortality assumption for disabled retirees is not used. However, disabled members, in general, will not live as long as service retired members. There tends to be more fluctuation in disabled mortality than healthy mortality because of differences in the types of disabilities. In addition the smaller number of exposures makes the results more volatile. Based on the results of our experience study, we recommend the disabled retired mortality be set to the greater of 3% or the 1994 GAM Table (95% of the Table for Females), plus 2.5%.

Protection Occupation Members: Complete data on retired members for the study period was not available. We relied on the trend seen in the general IPERS membership, as well as other systems covering similar occupations, in setting our assumption. Our experience with other systems indicates a general improvement in the mortality of both general and protection occupation members. We recommend the retired mortality assumption for protection occupation employees be changed to the 1983 Group Annuity Mortality Table. This reflects an improvement in mortality, but recognizes the difference in mortality between these members and general employees.

Active Members: The observed A/E Ratios are shown in the following chart. Rates of mortality among actives may be impacted by certain active members first moving to disabled status before death.

Active Deaths	1993-98 Observations		A/E Ratio
	Actual	Expected	Current
Male	205	348	57
Female	182	569	32
Totals	**387**	**917**	**42**

The experience indicates more favorable mortality than expected, a finding consistent with our postretirement mortality findings. However, we believe the number of deaths from active membership is understated due to the criteria imposed in the creation of the experience study data tape (deaths were reported based on both their date of death and payment date occurring before June 30). Therefore, active death rates are probably higher than what the actual data provided to us might indicate. As a result, we recommend the same mortality assumption be used for actives and retirees.

It is very likely that different employment groups exhibit different mortality. For example, it is common to find that School employees, and in particular teachers, exhibit better mortality than other employees. Although we attempted to include such analysis in our study, it was impossible to rely on the results because the employer code on the experience study data was missing for a significant percentage of the population, particularly in the earlier years of the study. In future experience studies, as data permits, we intend to study the experience of each group separately, in order to continue to refine the valuation process and more accurately determine liabilities.
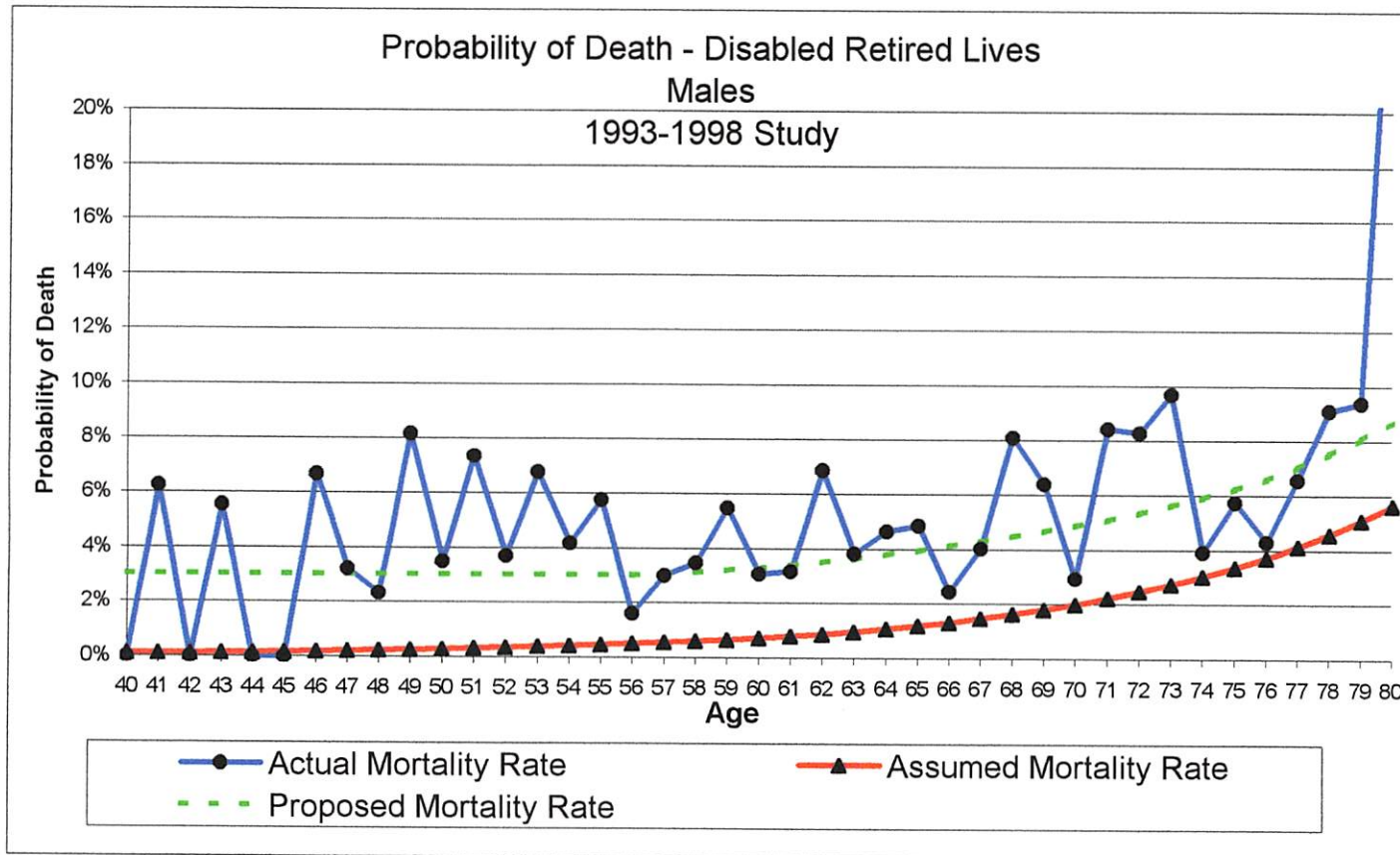
Graph 10

Probability of Death - Non Disabled Retired Lives
Males
1993-1998 Study
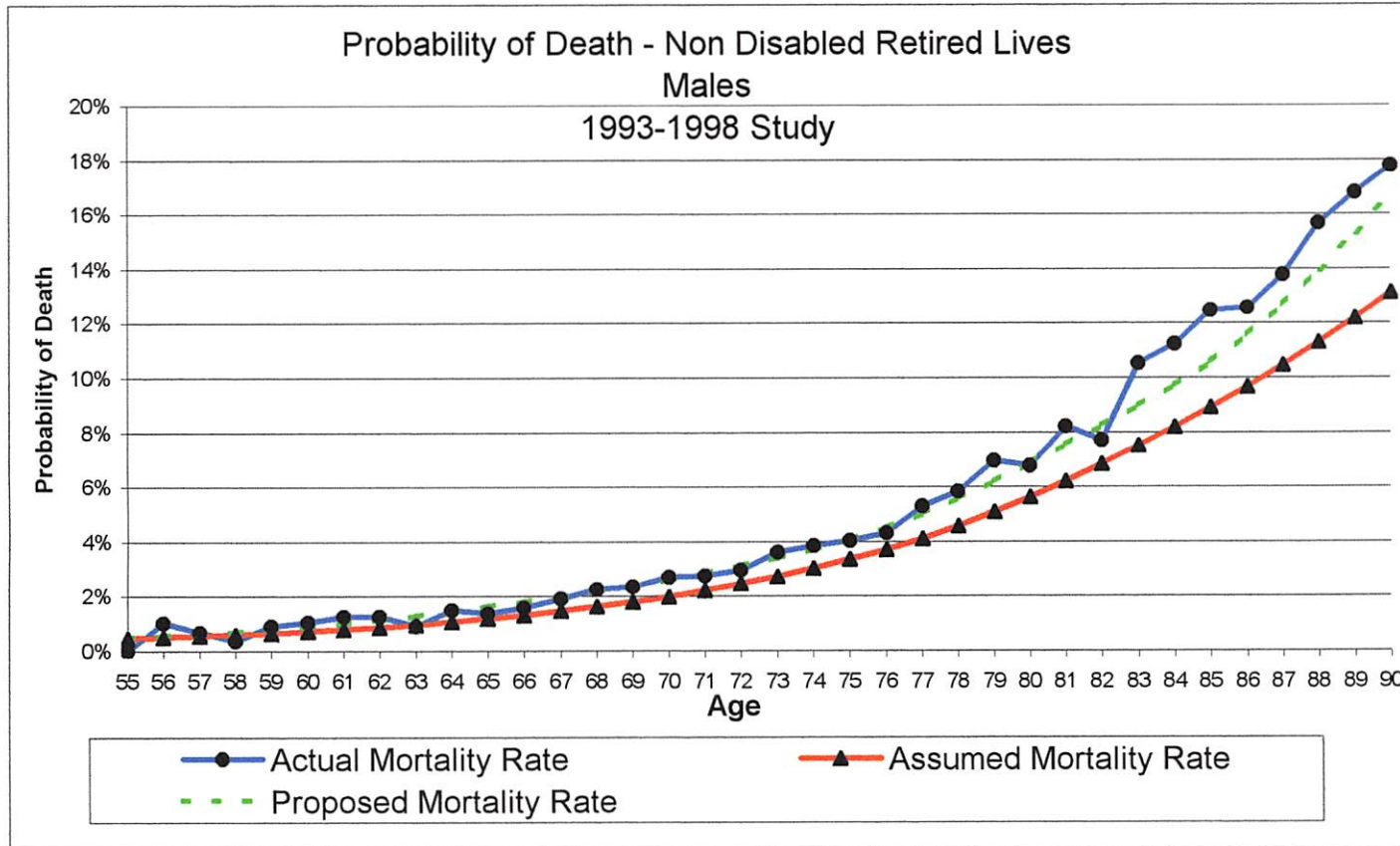
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	5,154	3,989.0	4,943.4
Actual/Expected		129.2%	104.3%

Graph 11

Probability of Death - Non Disabled Retired Lives
Females
1993-1998 Study
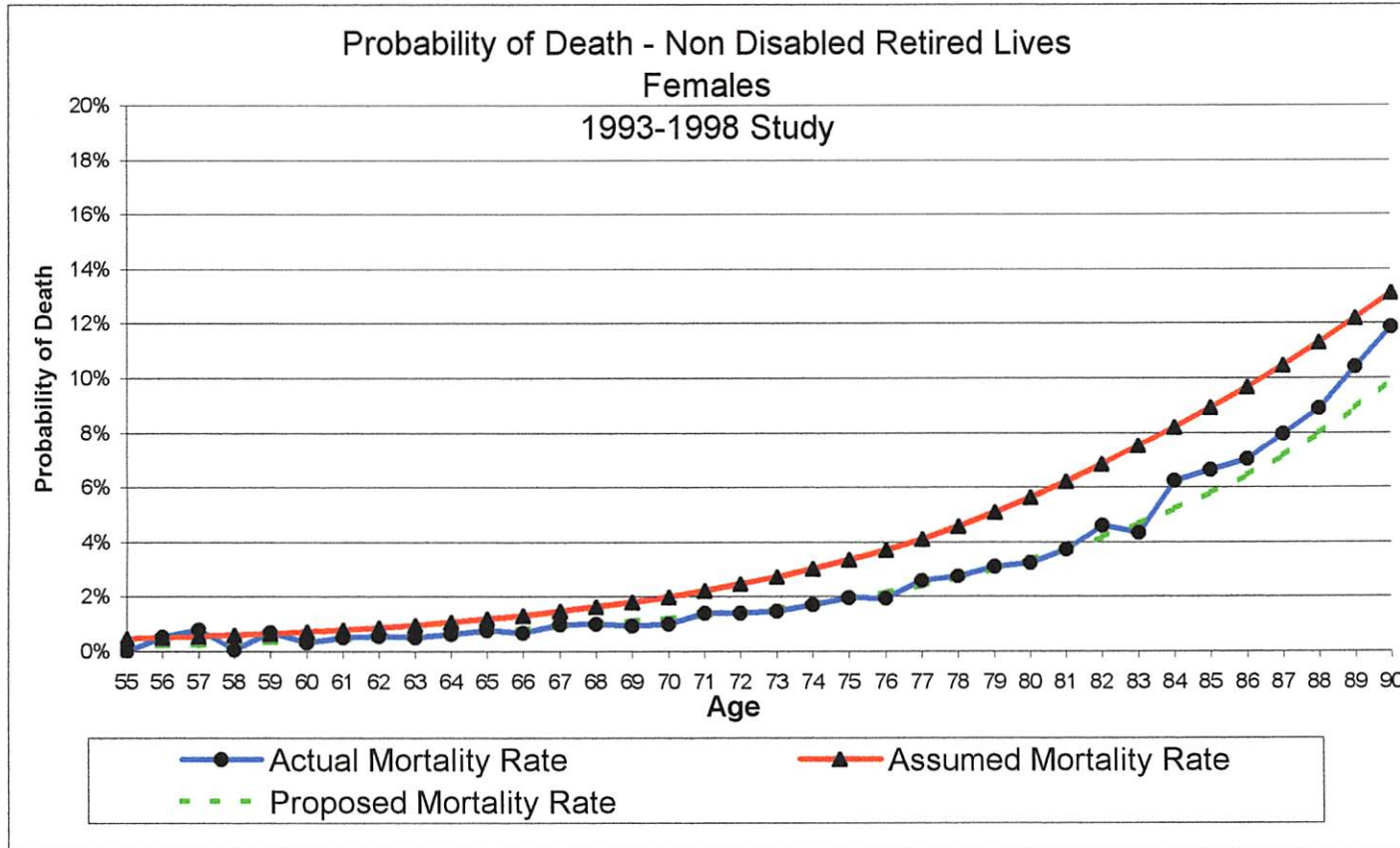
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	4,999	7,586.7	4,751.7
Actual/Expected		65.9%	105.2%

Graph 12

Probability of Death - Disabled Retired Lives
Males
1993-1998 Study

Legend:
- Actual Mortality Rate
- Assumed Mortality Rate
- Proposed Mortality Rate

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	256	68.0	207.1
Actual/Expected		376.5%	123.6%

Graph 13

Probability of Death - Disabled Retired Lives
Females
1993-1998 Study
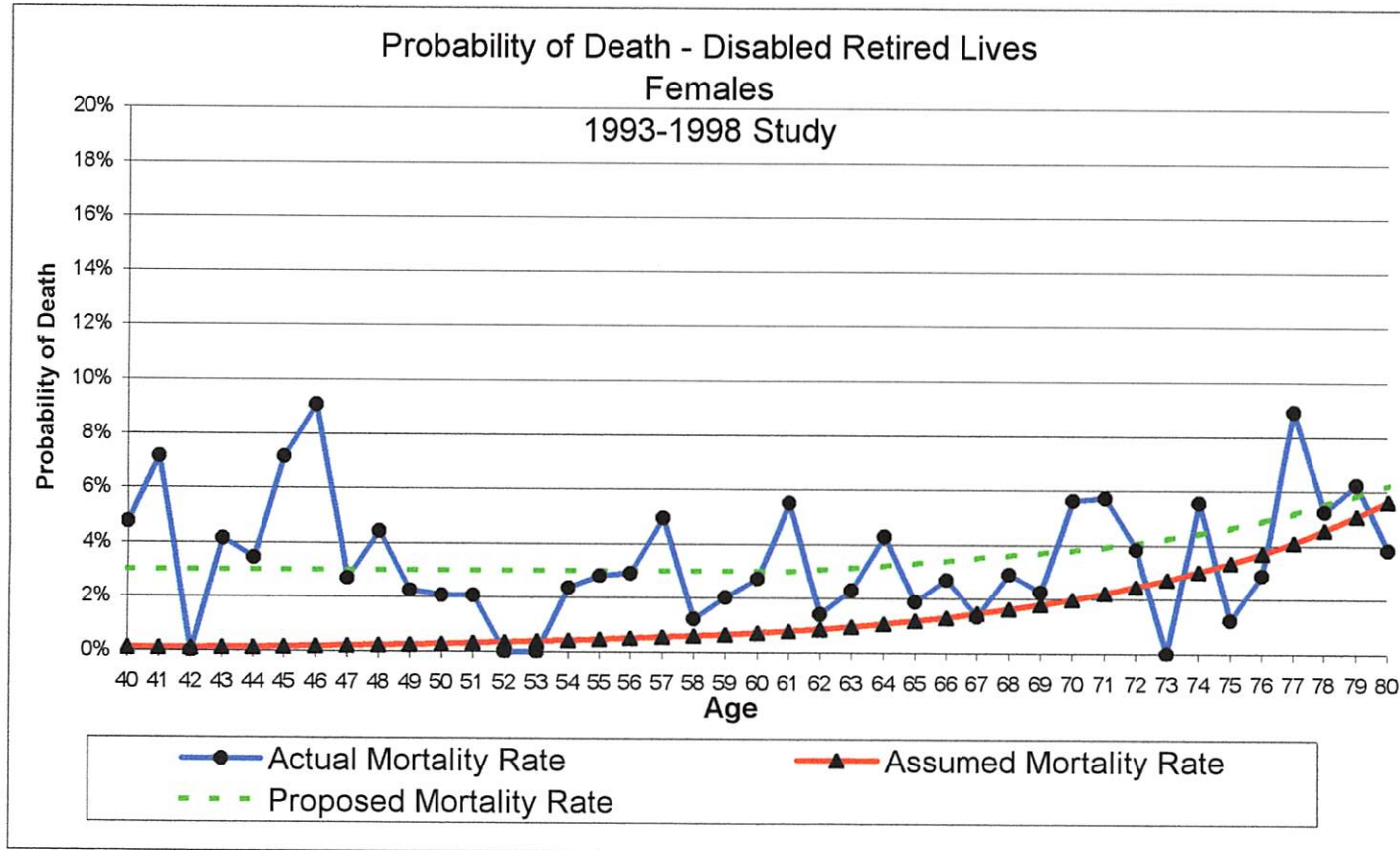
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	146	61.8	162.9
Actual/Expected		236.2%	89.6%

Section 6

RETIREMENT

Service retirement measures the change in status from active membership directly to retirement. This assumption does not study the retirement patterns of the retirees who terminated from active membership months or years prior to their retirement. That experience is studied separately.

The requirements for early retirement with a reduced benefit are age 55. The requirements for retirement with unreduced benefits are currently age 65 or age 62 with 20 years of service. However, the present provision for normal retirement age of age 62 and 20 years of service was not in place during the years studied. Full, unreduced benefits are also available if age plus service is at least equal to 88 (Rule of 88). This provision was first effective June, 1997. Prior to that, the "Rule of" was 90 points in 1996 and 92 points prior to that date.

The retirement experience during this period must be reviewed with a critical eye. The retirement benefit multiplier changed in 1994 and there were several changes in the provisions for unreduced retirement during the study period. It is possible these changes may have distorted the service retirement experience for some of the years in the experience study. Actual experience must be viewed carefully in evaluating whether it is representative of future experience. Furthermore, it is important to remember that the current assumptions, for retirement under the Rule of 88, although based on the experience under Rule of 92 with expected variances, were developed without the benefit of actual experience. It is not unusual for some adjustment in the rates to be necessary now that actual experience is available. In our analysis, we often grouped the more recent data and compared results to those for the entire study period. In most cases, we relied more heavily on recent experience as we felt it was more reflective of what is likely to happen in future years.

Among the members at any age who are eligible to retire with unreduced benefits (Rule of 88 or normal retirement), those who are in their first year of meeting the eligibility requirements are generally more likely to retire than those who met that requirement more than a year ago. We refer to retirement rates for those in their first year after such eligibility as "select" and those beyond that first year as "ultimate." This is the basis for evaluation of experiences and assumption setting.

Although the counts of actual and expected retirements are shown below, review of the graphs for retirement experience will provide greater insight into the actual experience and proposed rates. The overall count of actual and expected retirements is important, but the "fit" of the rates (the age at which members elect to retire) is critical. In general, the earlier a member retires, the more expensive it is to the System. Therefore, it is extremely important to the accurate measurement of liabilities that the allocation of retirements among ages be accurate as well as the overall total count.

IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM
1998 EXPERIENCE STUDY

The summary results of our experience study are shown below:

	1993-98 Retirements			A/E Ratio	
	Actual	**Expected (Current)**	**Expected (Proposed)**	**Current**	**Proposed**
Early	4,151	6,743	5,380	62	77
Select	2,717	4,294	3,013	63	90
Ultimate	3,990	5,226	5,232	76	76
Total	**10,858**	**16,263**	**13,625**	**67**	**80**

As mention earlier, more recent experience was given more credibility in our analysis. In general, the "fit" of the retirement rates is much closer to the experience in 1996 and 1997.

Terminated vested members are currently assumed to retire at age 63. The experience analyzed during the study period indicated an average age of 62. Given the fact that Social Security benefits are first available at age 62, we feel it is reasonable to assume most inactive vested members will begin drawing benefits at age 62.

Protection Occupation Employees: The eligibility for retirement is different for protection occupation employees and therefore, a different retirement assumption is used for the valuation of liabilities for this group. Experience during the study period indicated lower actual retirement rates than assured an A/E ratio of 63%. We recommend lowering the retirement rates slightly to partially reflect this experience.

The retirement assumption is very important because the earlier a member retires, the more expensive it is to the System. Our recommended rates modify the retirement assumptions reflecting overall lower usage of early retirement and retirement in the first year of eligibility. However, after initial eligibility for normal retirement, rates increased. Due to (1) the critical nature of this assumption; (2) the fact there was limited credible data for the Rule of 88 during the study period; and (3) the change to normal retirement at age 62 and 20 years of service was not in effect. We recommend the experience be monitored closely in future years. If developing trends show rates significantly different than assumed, adjustments to the actuarial assumption should be made.
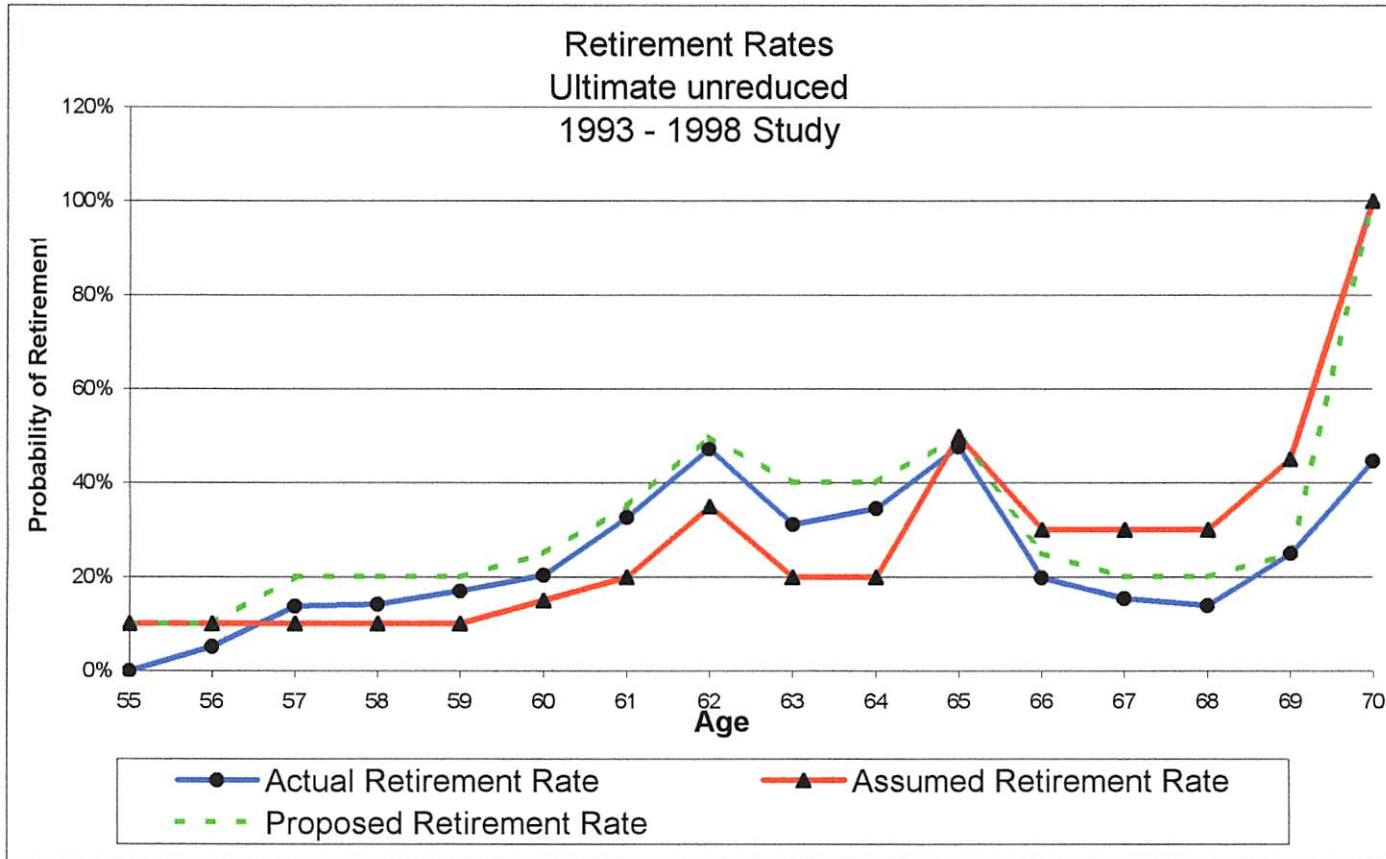
Graph 14

Retirement Rates
Early
1993 - 1998 Study
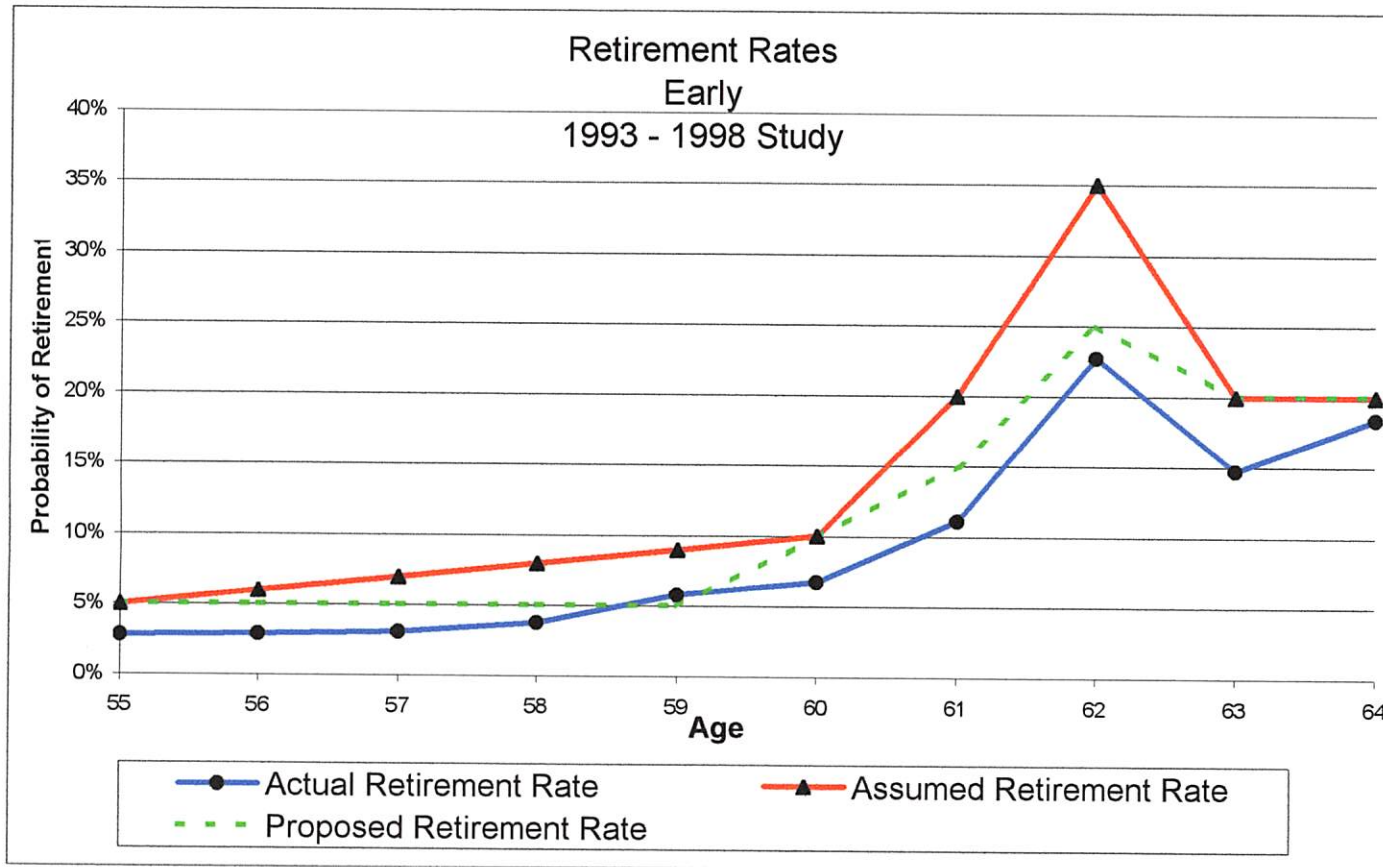
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	4,151	6,743.1	5,379.8
Actual/Expected		61.6%	77.2%

Graph 15

Retirement Rates
Select
1993 - 1998 Study
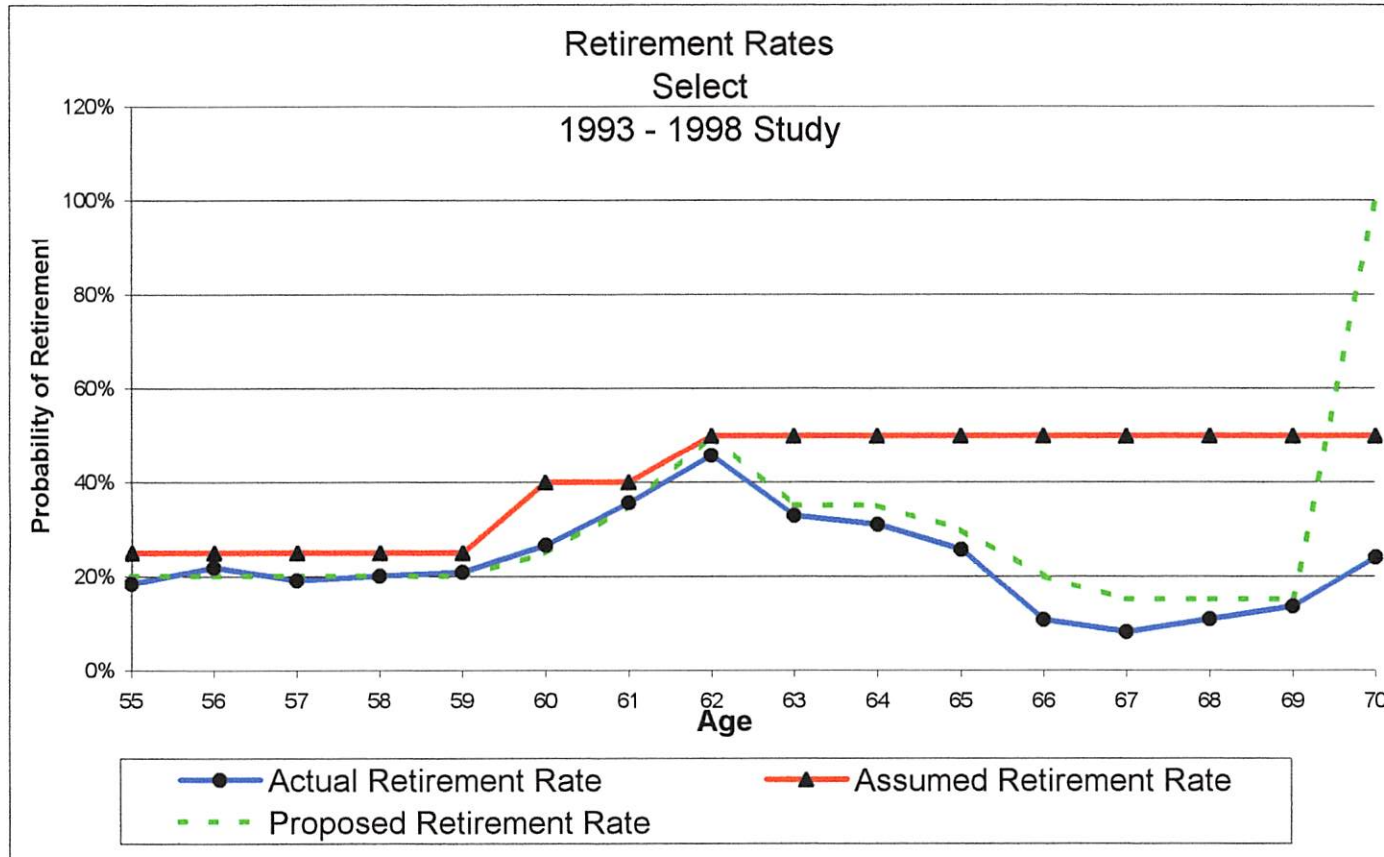
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	2,717	4,294.1	3,013.2
Actual/Expected		63.3%	90.2%

Graph 16

Retirement Rates
Ultimate unreduced
1993 - 1998 Study

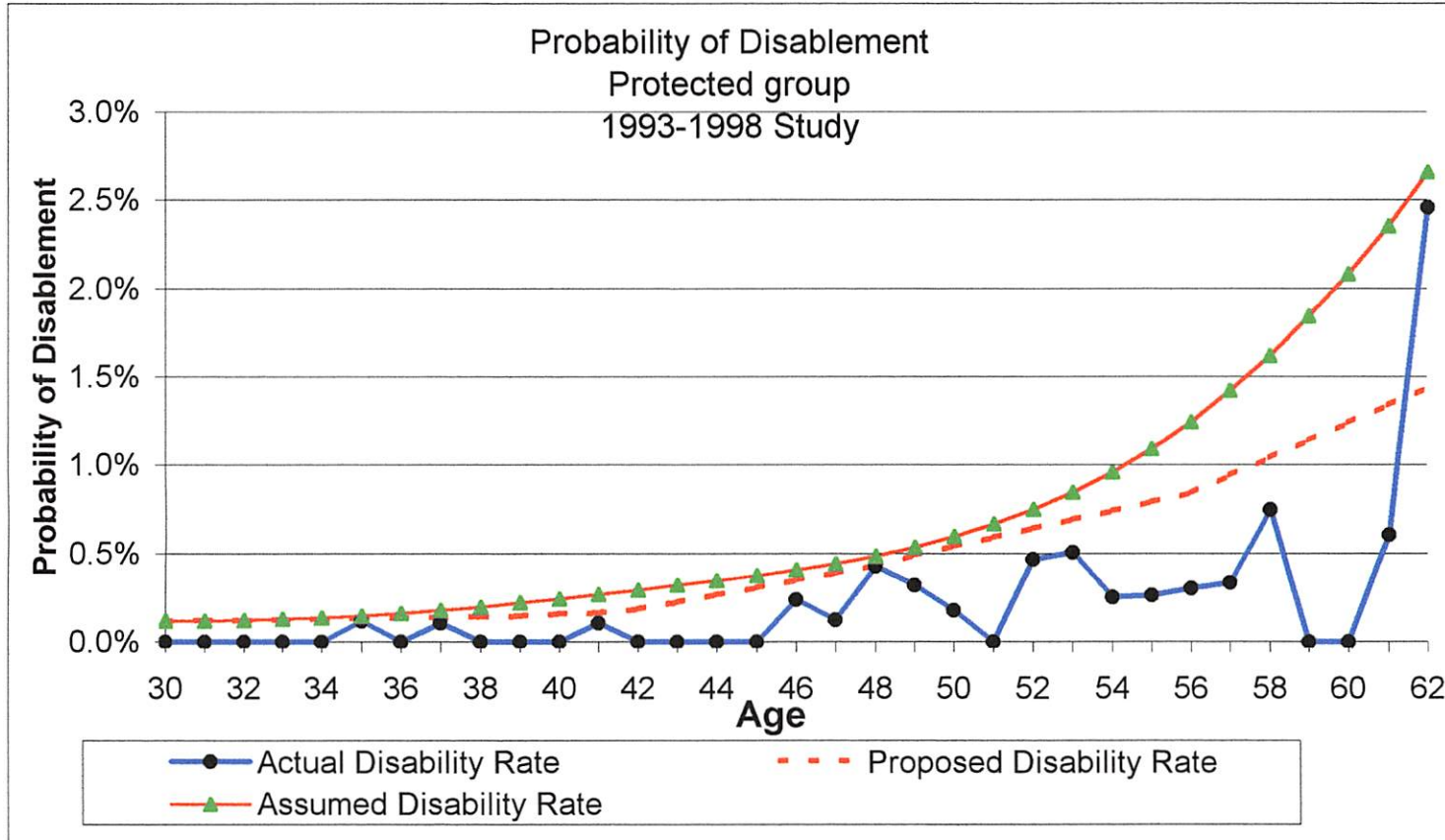|	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	3,990	5,226.3	5,231.8
Actual/Expected		76.3%	76.3%

Section 7

DISABILITY

Currently, a specific assumption is not used to anticipate the occurrence of disability among active general members. The probability of disability is included in the probability of termination of employment. However, the benefits paid to a member from the System upon disability are not the same as those paid upon termination of employment. Furthermore, the mortality of such members is not the same as a terminated member. The two items have a somewhat offsetting impact. The use of a disability assumption will allow a more accurate measurement of the liabilities of the System and we recommend the disability assumption included in this report be adopted.

The determination of liabilities and contribution rates for protection occupation employees does include a specific disability assumption. The actual and expected number of disabilities were analyzed. Due to the small number of exposures for female protection occupation employees, we are recommending one set of rates for both male and female in this group. Furthermore, due to the smaller size of the group, their actual experience was considered but not given full credibility.

The table below indicates the number of actual and expected disabilities during the study period and the A/E Ratios.
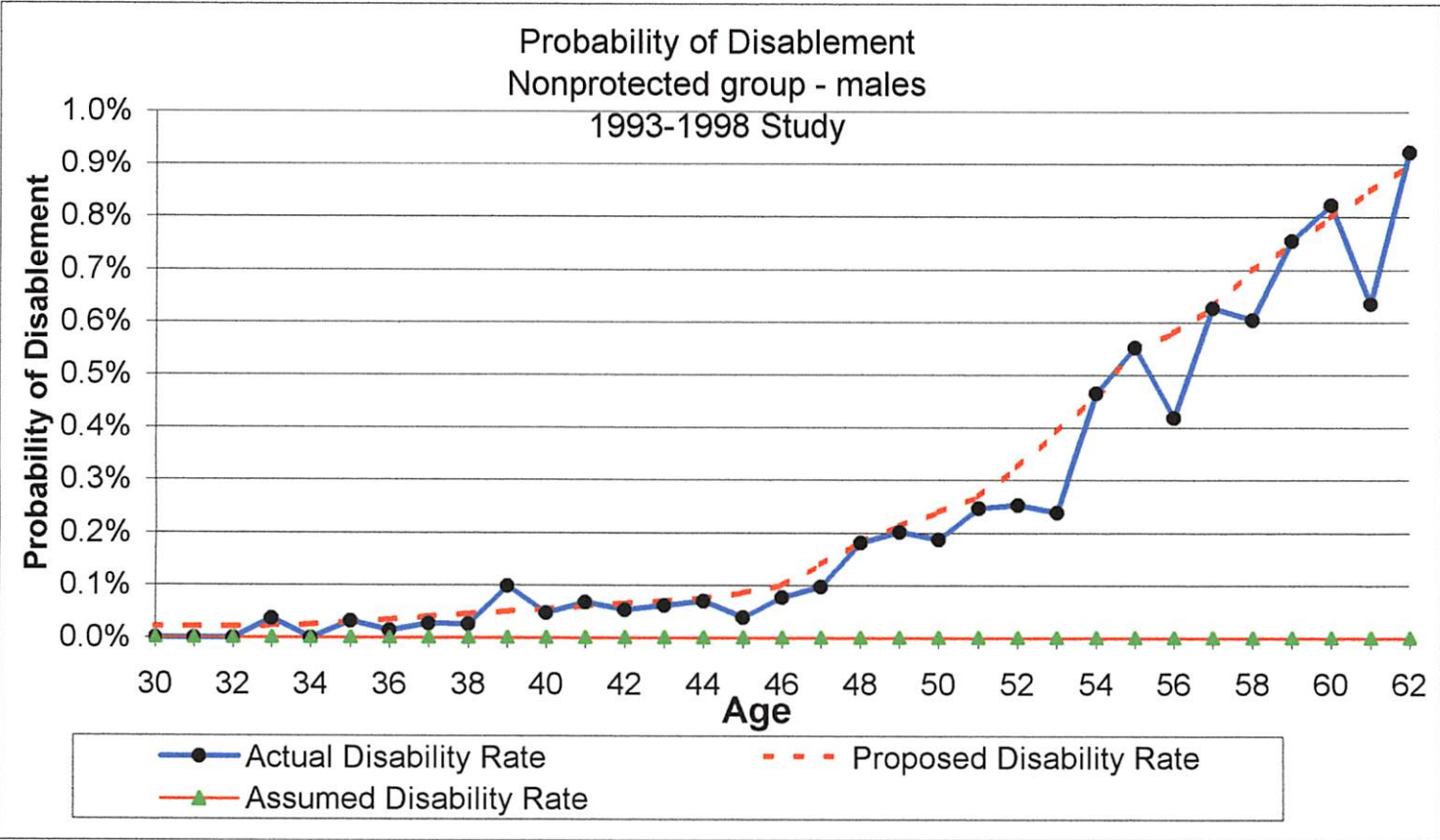
Disability	1993-98 Observations		A/E Ratio	
	Actual	**Expected**	**Current**	**Proposed**
Protection Occupation	26	93	28	37
General Members				
Males	512	N/A	N/A	89
Females	544	N/A	N/A	87

Graph 17

Probability of Disablement
Protected group
1993-1998 Study

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	26	92.7	69.5
Actual/Expected		28.0%	37.4%

Graph 18

Probability of Disablement
Nonprotected group - males
1993-1998 Study

Legend:
- Actual Disability Rate
- Proposed Disability Rate
- Assumed Disability Rate

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	512	NA	578.6
Actual/Expected		NA	88.5%

Graph 19

Probability of Disablement
Nonprotected group - females
1993-1998 Study

Legend:
- Actual Disability Rate
- Proposed Disability Rate
- Assumed Disability Rate
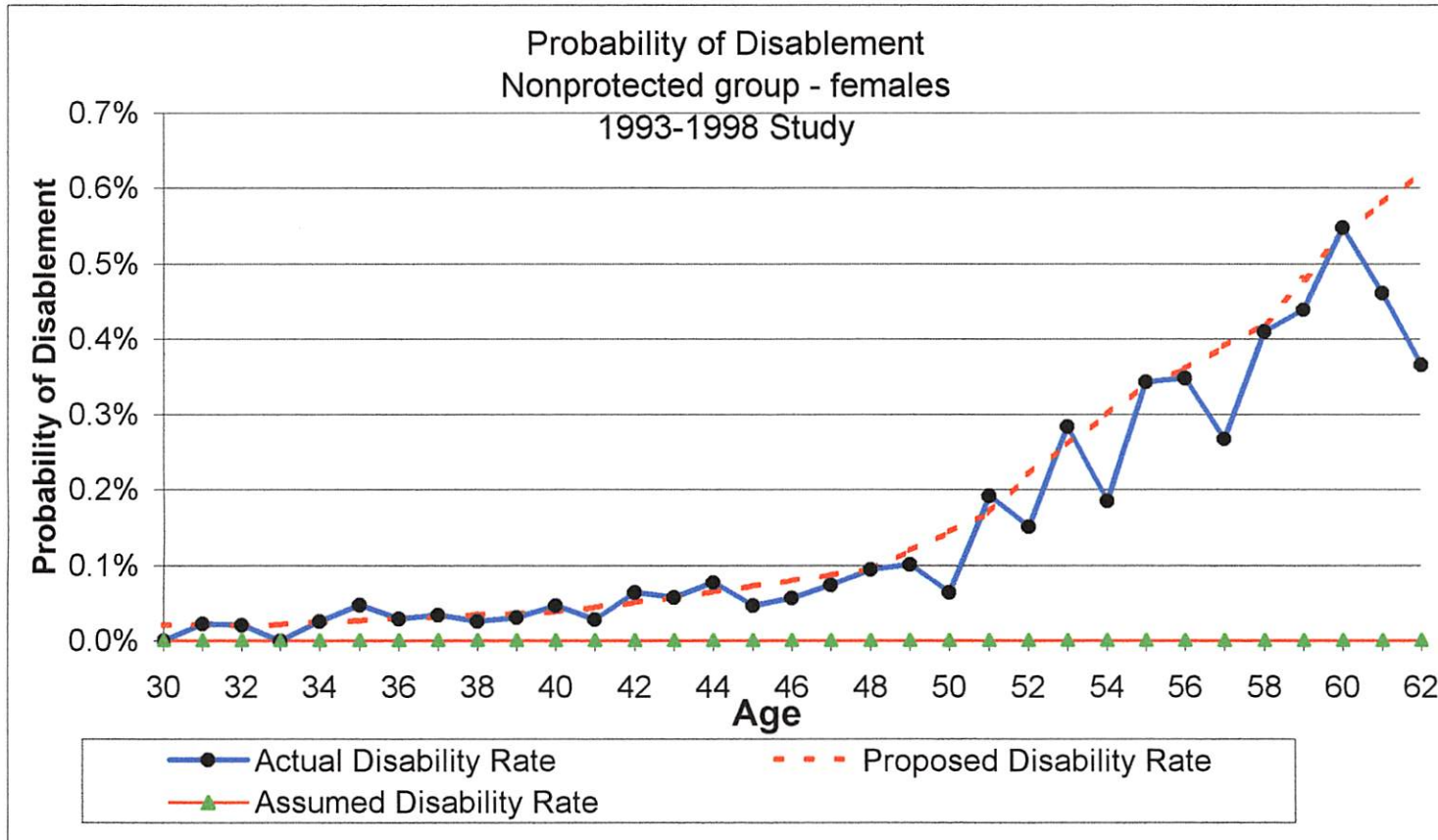
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	544	NA	627.8
Actual/Expected		NA	86.6%

Section 8

TERMINATION OF EMPLOYMENT

This section of the report summarizes the results of our study of termination from active employment for reasons other than death, retirement, or disability.

In the past, unisex termination assumptions based only on age have been used. Based on the current assumptions, the A/E ratio for the entire study period was 71%, i.e. actual withdrawals were lower than expected during the study period. This continues the trend observed in the prior experience study. In fact, termination rates were lowered as a result of the 1993 Experience Study and resulting A/E ratios are still well below 100%. Rates of termination of employment tend to vary with gender as reflected in the gender specific A/E ratios resulting from separate analysis for male and female (Male: 58%, Females: 79%). We also analyzed results on duration, i.e. years of service. As might be expected, withdrawal rates are much higher in the earlier years of employment and decline significantly as service extends. We are recommending use of withdrawal rates based upon service, age, and gender. This approach recognizes the fact that a 40-year old with 10 years of service is less likely to terminate than a 40-year old with 1 year of service. This is important in the valuation because older members with high years of service have the largest liabilities and, thus, their experience can have a dramatic impact on the System's liabilities and funding.

Past experience may not always be a good indicator of future experience. Withdrawal rates tend to be somewhat connected to economic conditions, but there is also a general consensus there will be a "labor shortage", which may result in higher withdrawal rates in the future than those seen in recent years. In order to reflect this expectation, the withdrawal rates from actual experience were increased 10% of the actual observed rates. Future experience studies should closely track actual experience, as well as the impact of projected labor markets in evaluating this assumption.

Analysis of experience by each year indicated that withdrawals were probably understated for the 1993-94 and possibly 1994-95 years. Again, the change in the format and content of the data provided made the data for this period less credible. Therefore, more credibility was given to the experience from 1995-1999. Experience from 1998-99 was included to provide more underlying data and therefore more statistical reliability.

The following chart shows the actual and expected number of terminations for causes other than death, retirement, or disablement, and the A/E Ratios, for both the current and proposed assumptions for IPERS members. Please see the appropriate graphs for the current and proposed withdrawal assumptions as they provide much more detailed information on the changes in assumptions.

IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM
1998 EXPERIENCE STUDY

Termination	1993-99 Observations		A/E RATIO	
	Actual	**Expected**	**Current**	**Proposed**
Male	11,449	19,720	58%	74%
Female	27,827	35,386	79%	75%
Total	**39,276**	**55,106**	**71%**	**74%**

The A/E ratio on the proposed assumption is not close to 100%. This is the result of two factors:

(1) The proposed rates have been increased 10% as discussed earlier and
(2) The A/E ratio is based on the entire study period, including 1993 and 1994 for which terminations appeared low.

The A/E ratio using the proposed rates and actual experience during 1996-99, is 91%.

The termination rates for the protection occupation group were studied. Actual terminations were lower than the current assumption. Rates were lowered slightly to reflect this experience.

WITHDRAWALS OF MEMBER ACCOUNTS

Members who terminate active employment may elect to receive a distribution of their member account balance. We always assume nonvested members will elect a refund, but that some portion of vested members will leave their money with the System to receive a deferred benefit. We currently use an assumption, which was developed based on input from System personnel and national trends. This is the first experience study that has included an analysis of withdrawal of contributions by vested members. Prior to this study complete data was not available to enable such analysis.

As part of our experience study, we studied the number of vested members electing the withdrawal of their account balance. It correlates closely to the member's age at termination of employment and was somewhat varied by group and gender. However, the data was not reliable in all years and therefore did not allow complete analysis by group. As a result, our recommended rates are only gender and age based.

The following summarizes our results:

		Percent of Vested Members Leaving Money with System			
		Actual		**Proposed**	
Age	**Current**	**Male**	**Female**	**Male**	**Female**
25	0	40	50	0	0
30	10	45	55	10	20
35	20	50	60	20	30
40	40	60	70	40	55
45	50	70	89	70	85
50	100	80	85	85	85
55	100	*	*	100	100

*Not measured since eligible for early retirement benefits

In setting this assumption for use in future valuations, consideration had to be given to the potential increase in such rates due to the legislative change allowing a partial refund of the employer contribution account (first effective July 1, 1999). This provision will likely increase the percentage of members electing a refund, whether or not it is in the member's best financial interest. Because no experience is available on the new provision, all we can do is use our best collective judgment in developing expected rates. This assumption should be monitored closely as experience develops over the next few years.

It was assumed the election of a refund by protection occupation employees would occur at a lower rate than for general membership employees (due to earlier normal retirement age). The above table was used, but with a 10 year age set forward (25 year old protection occupation member would elect a refund at the same rate as a 35 year old general member).
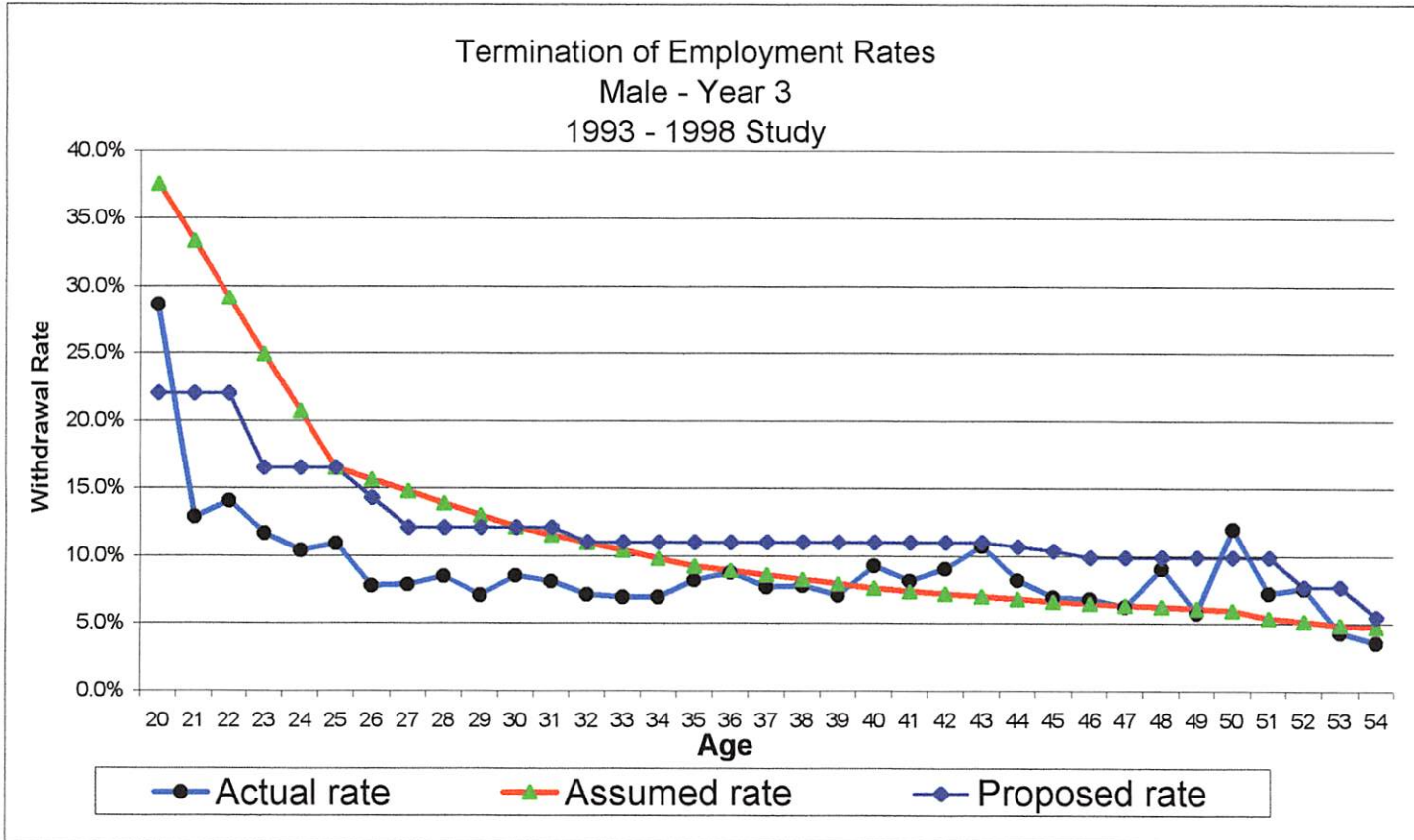
Graph 20

Termination of Employment Rates
Male - Years 0 -1
1993 - 1998 Study
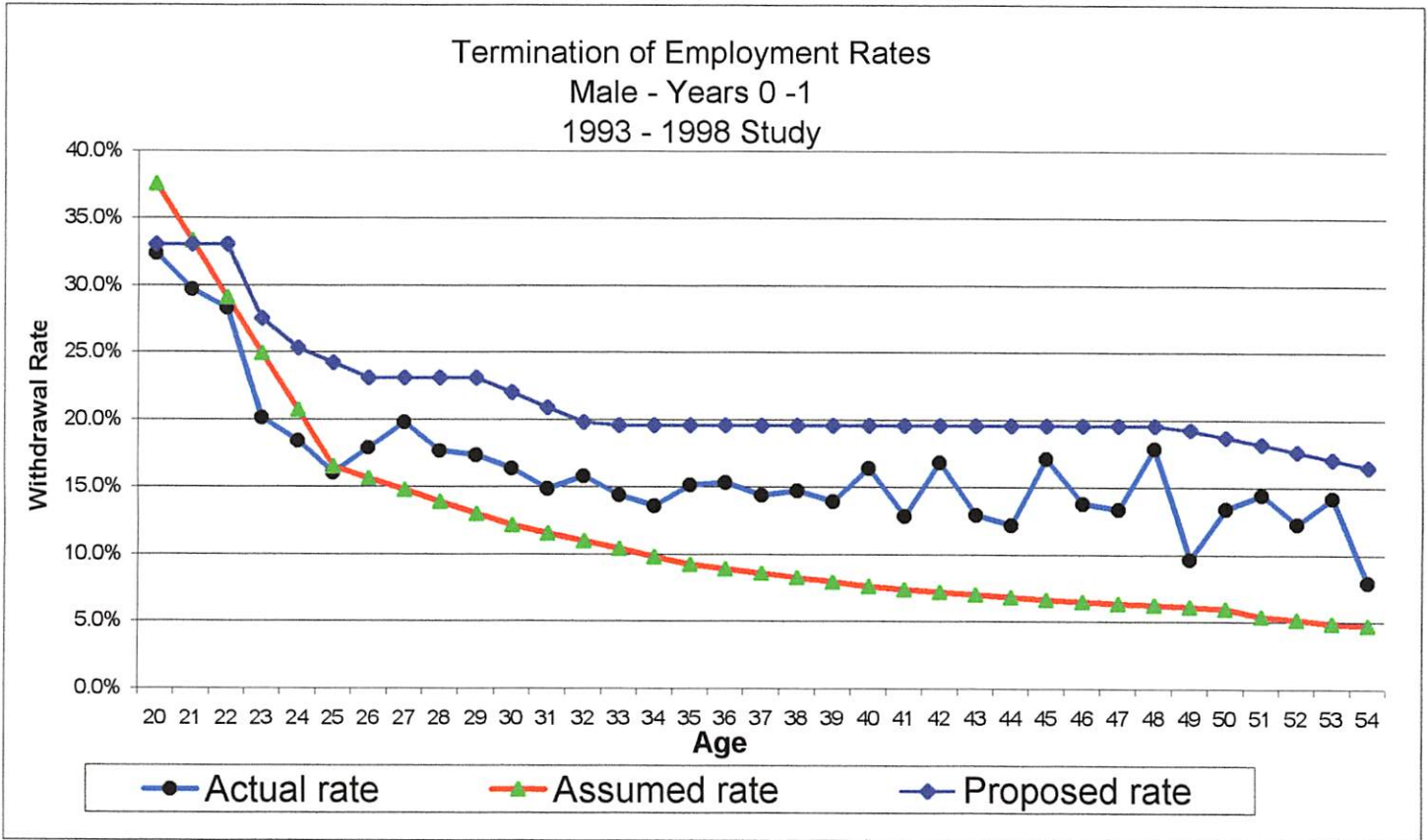
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	3,259	2,427.1	4,343.6
Actual/Expected		134.3%	75.0%

Graph 21

Termination of Employment Rates
Male - Year 2
1993 - 1998 Study
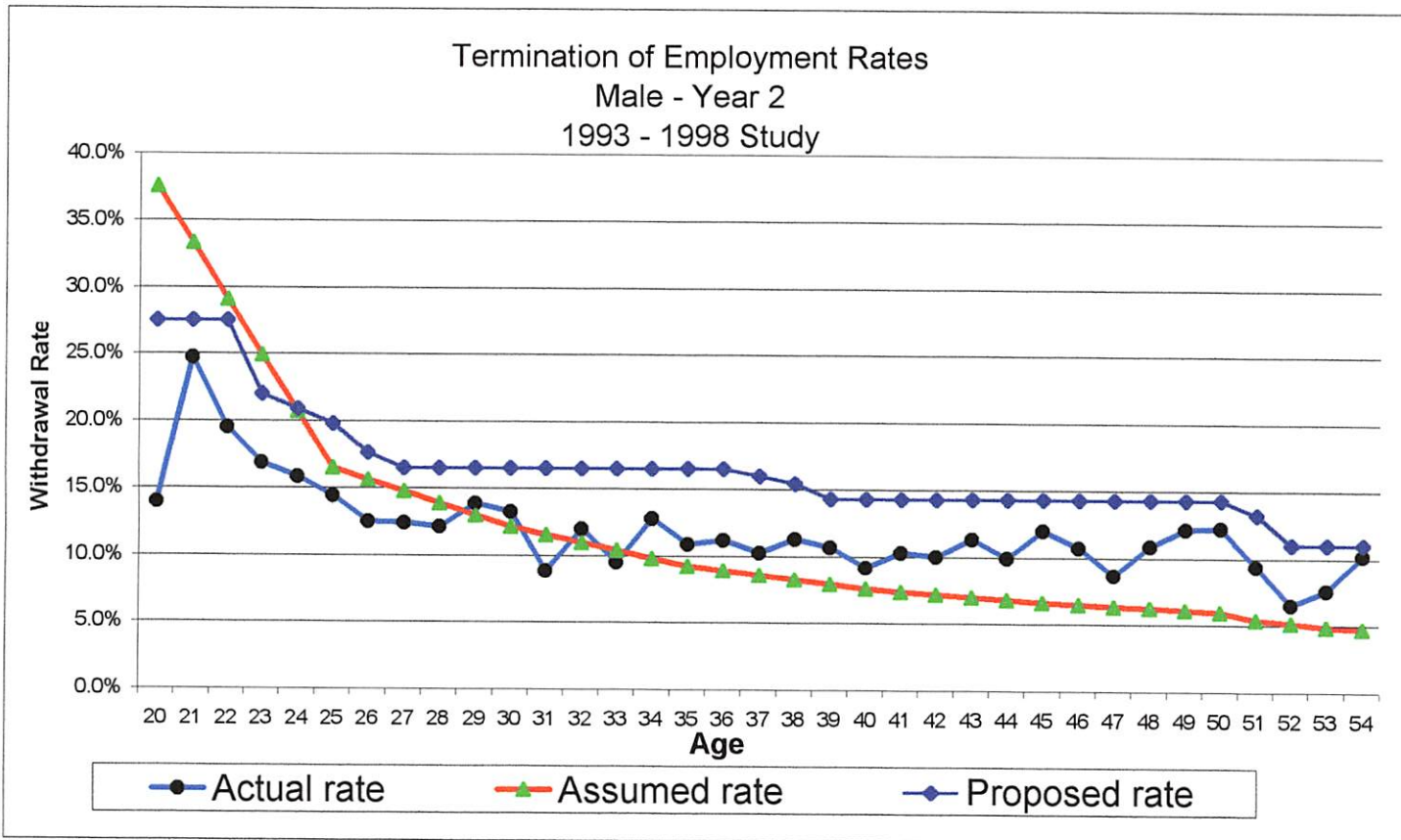
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	1,844	1,739.5	2,546.2
Actual/Expected		106.0%	72.4%

Graph 22

Termination of Employment Rates
Male - Year 3
1993 - 1998 Study

	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	1,117	1,435.0	1,598.0
Actual/Expected		77.8%	69.9%

Graph 23

Termination of Employment Rates
Male - Years 4 - 6
1993 - 1998 Study
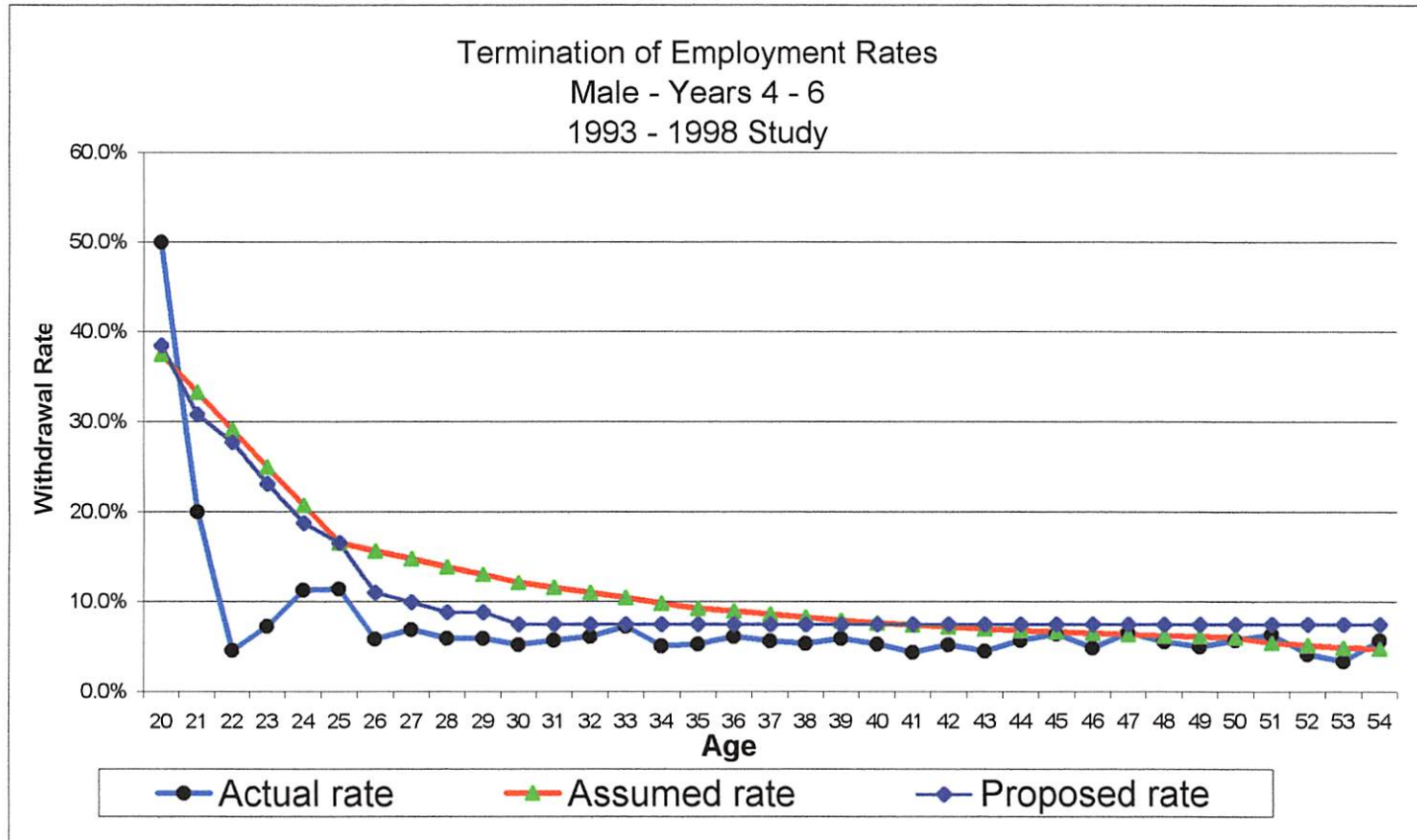
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	1,951	3,188.3	2,723.6
Actual/Expected		61.2%	71.6%

Graph 24

Termination of Employment Rates
Male - Years 7 - 8
1993 - 1998 Study
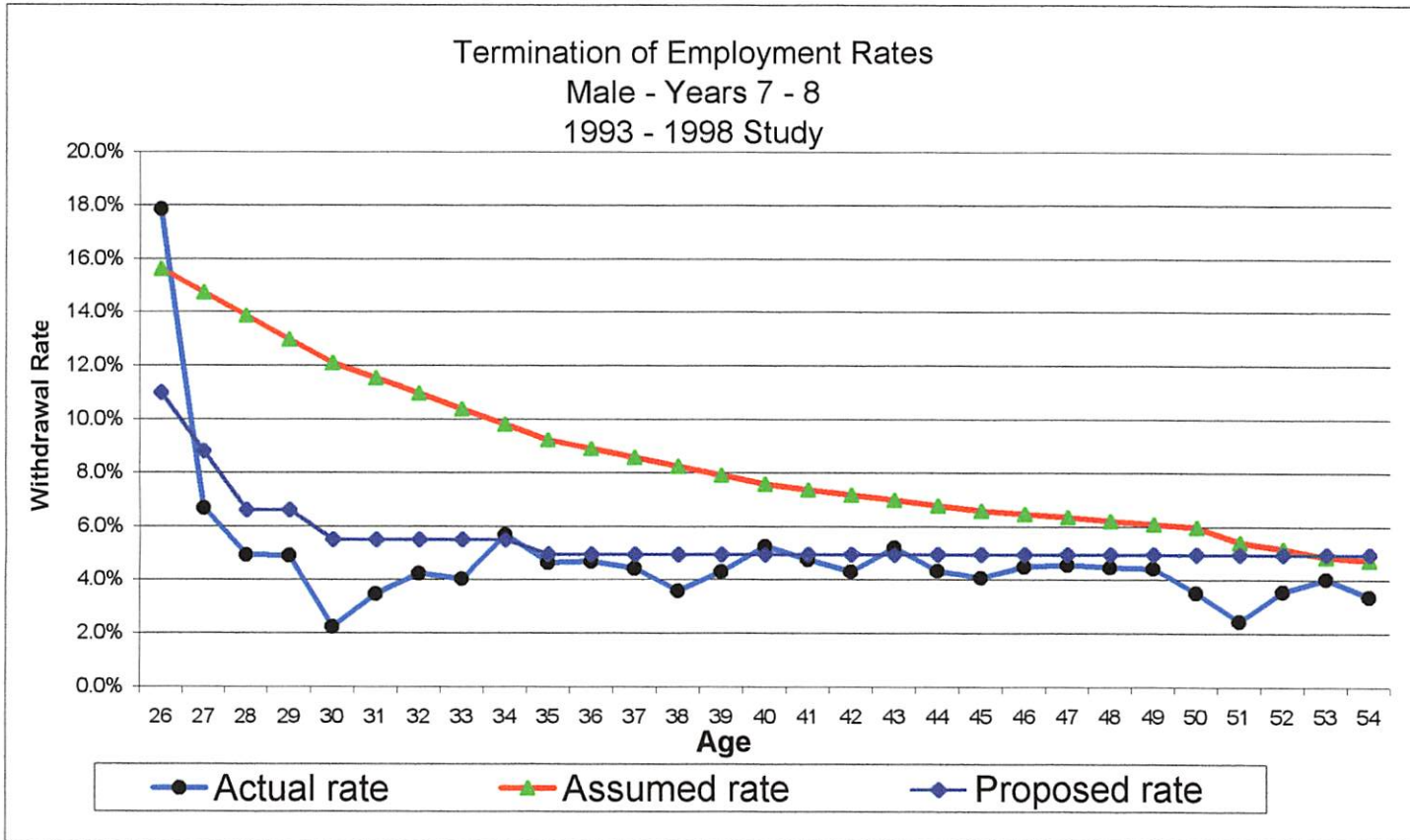
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	821	1,606.0	989.4
Actual/Expected		51.1%	83.0%

Graph 25

Termination of Employment Rates
Male - Years 9 & up
1993 - 1998 Study
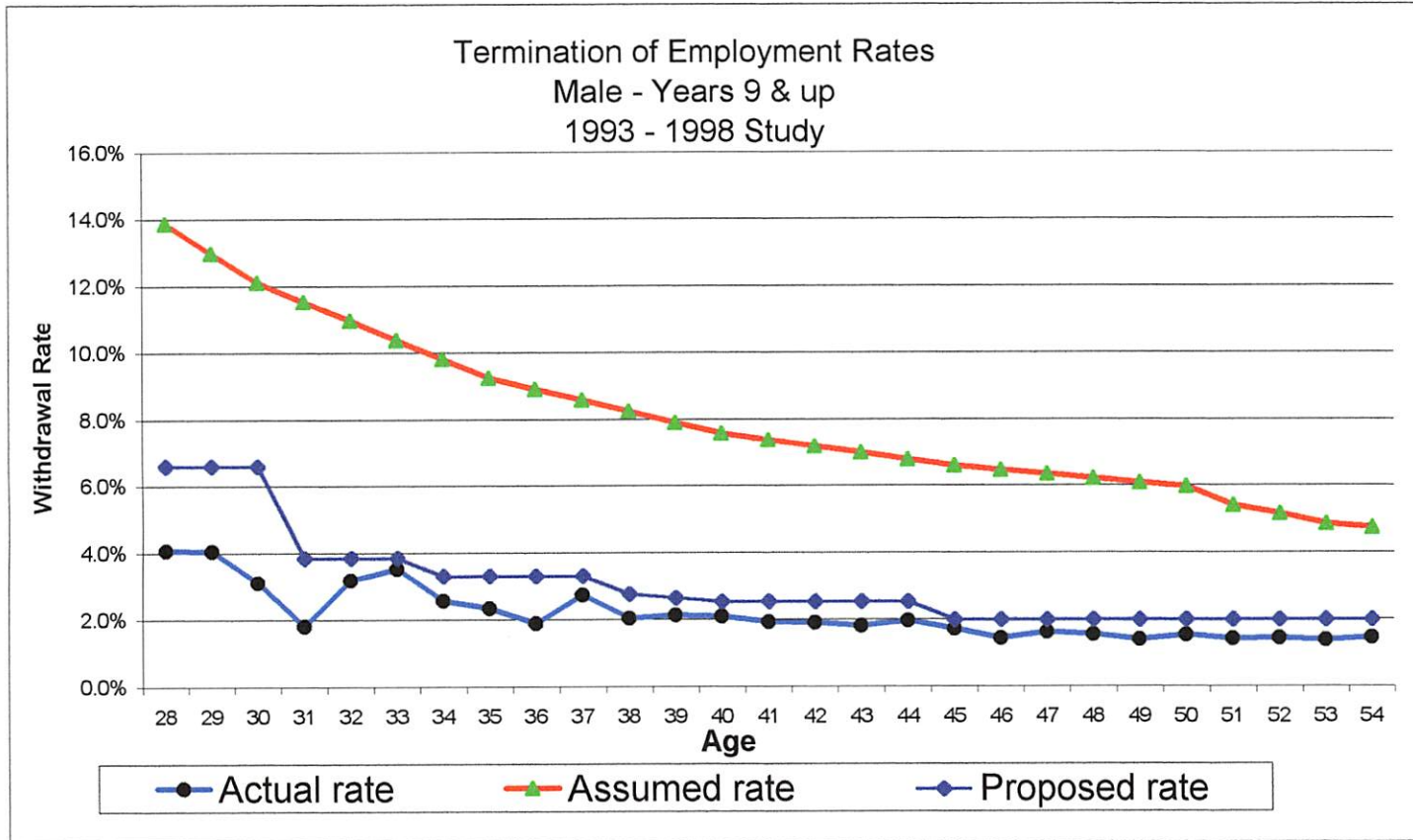
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	2,457	9,325.3	3,246.2
Actual/Expected		26.3%	75.7%

Graph 26

Termination of Employment Rates
Female - Years 0 -1
1993 - 1998 Study
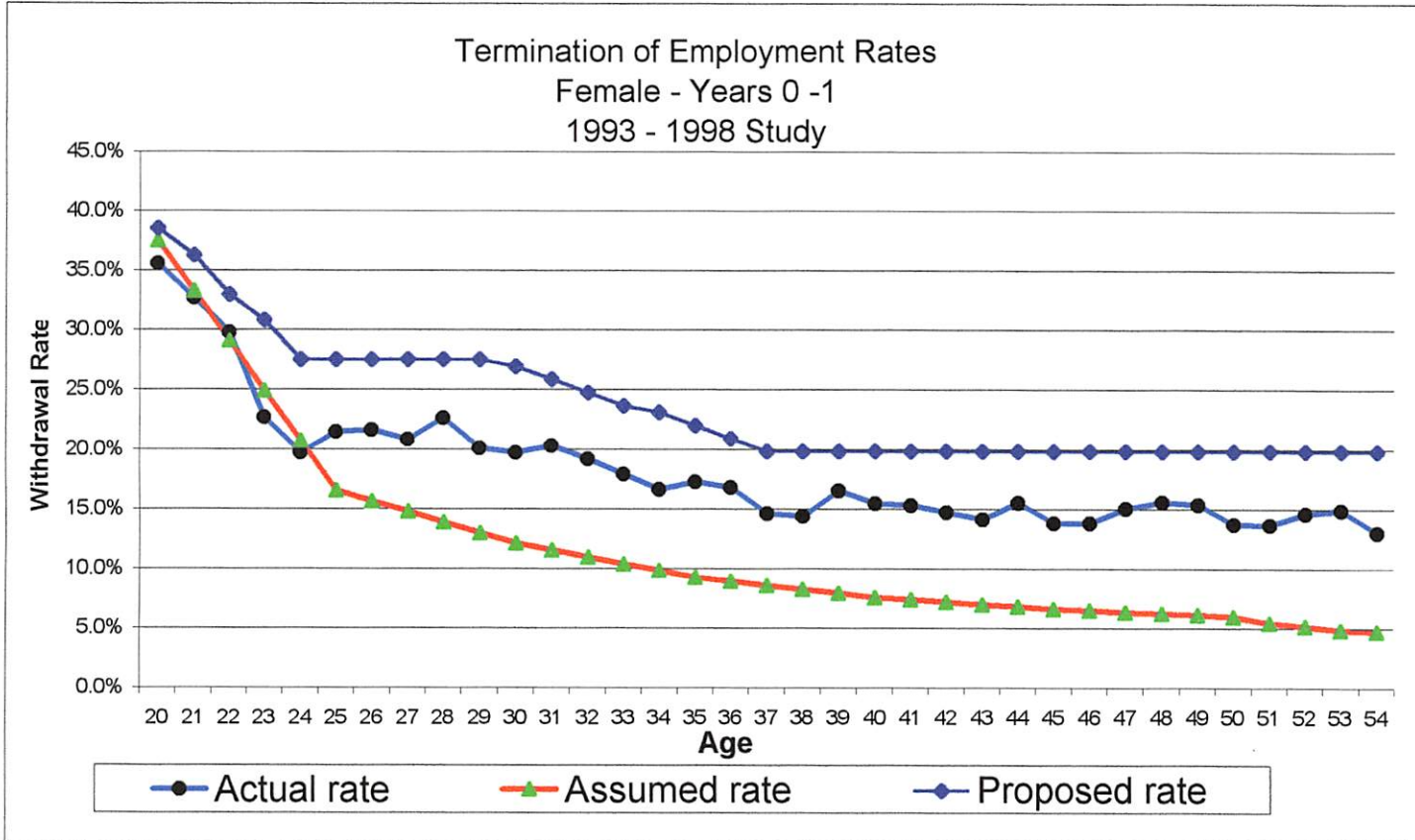
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	8,254	5,319.4	10,796.8
Actual/Expected		155.2%	76.4%

Graph 27

Termination of Employment Rates
Female - Year 2
1993 - 1998 Study

Legend: Actual rate, Assumed rate, Proposed rate
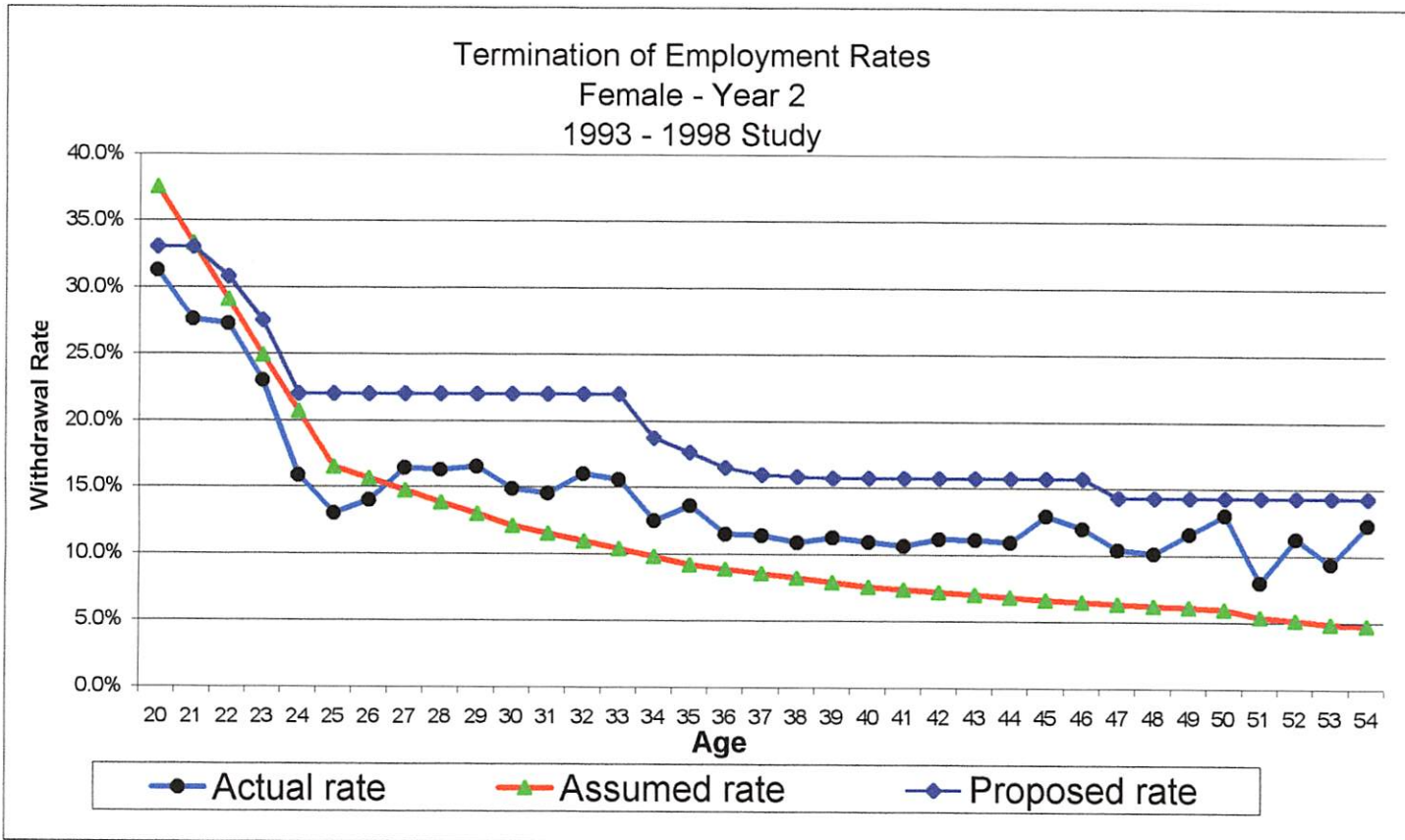
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	4,741	3,788.0	6,629.6
Actual/Expected		125.2%	71.5%

Graph 28

Termination of Employment Rates
Female - Year 3
1993 - 1998 Study
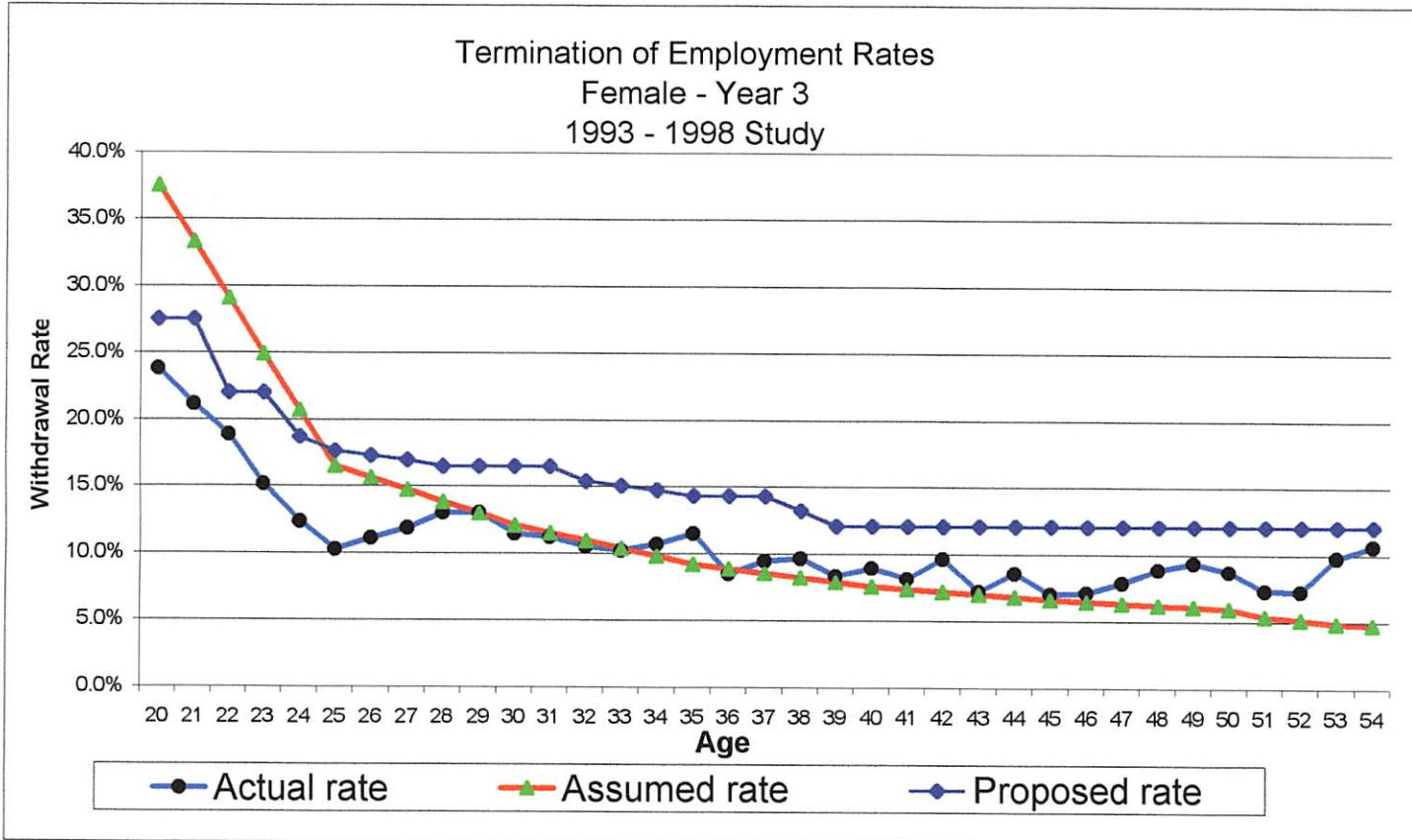
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	3,039	3,020.7	4,374.2
Actual/Expected		100.6%	69.5%

Graph 29

Termination of Employment Rates
Female - Years 4 - 6
1993 - 1998 Study
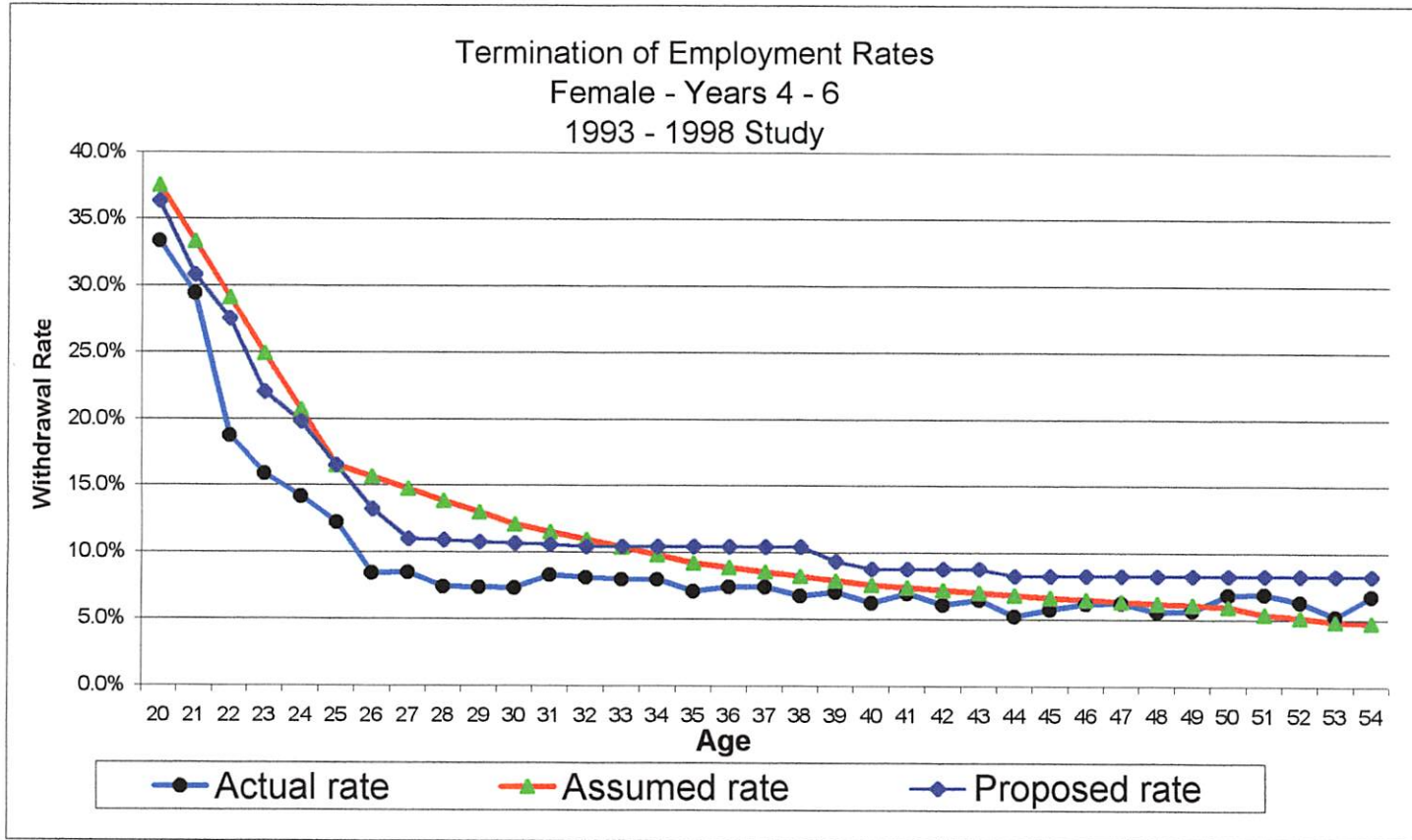
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	5,284	6,727.9	7,322.5
Actual/Expected		78.5%	72.2%

Graph 30

Termination of Employment Rates
Female - Years 7 - 8
1993 - 1998 Study
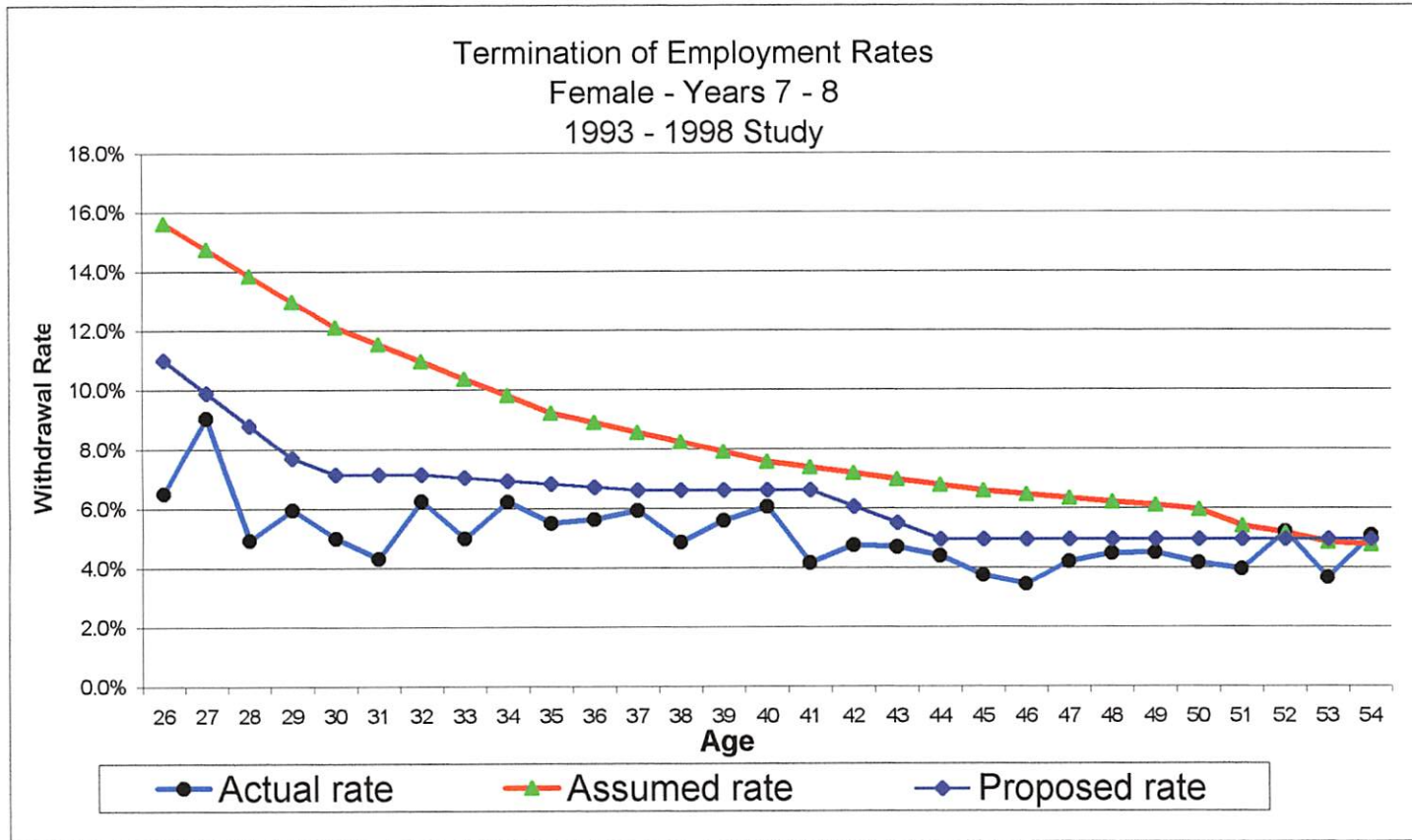
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	1,950	3,228.7	2,429.9
Actual/Expected		60.4%	80.2%

Graph 31

Termination of Employment Rates
Female - Years 9 & up
1993 - 1998 Study
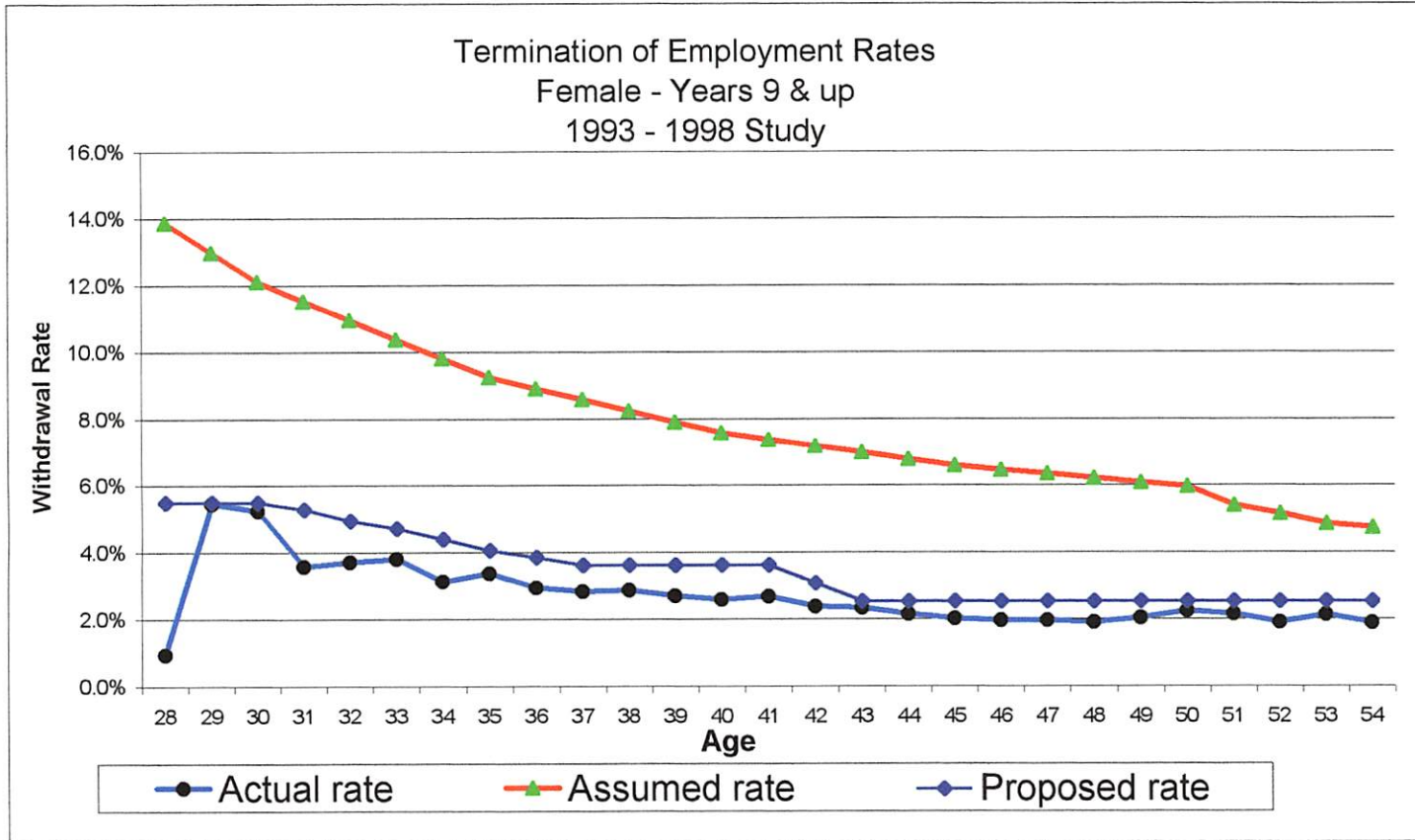
	Actual	Expected - Current Assumptions	Expected - Proposed Assumptions
Total Count	4,559	13,311.7	5,773.3
Actual/Expected		34.2%	79.0%