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## **North Carolina Retirement Systems**

### **Experience Study Supplement**

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# Actuarial Certification

- The results were prepared under the direction of actuaries who meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. These results have been prepared in accordance with all applicable Actuarial Standards of Practice, and we are available to answer questions about them.
- Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements, and changes in plan provisions or applicable law.

**Larry Langer, ASA, EA, MAAA, FCA**  
Principal and Consulting Actuary

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Consulting Actuary

# Supplement

- Summary of Proposed Assumptions
- Support for Proposed Assumptions

# Summary of Assumptions

Summary of the following assumptions for each plan:

- Mortality
- Retirement
- Termination
- Disability
- Salary Merit Scale

# Summary of Assumptions

## Plan

### TSERS:

### -Teachers

-General Employees  
-Other Education  
-Law Enforcement  
CJRS  
LRS  
National Guard  
DIPNC  
FRSWPF  
LGRS:  
-General Employees  
-Fire & Rescue  
-Law Enforcement  
RODs  
Death

## Mortality

### Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
Teachers	Male	Pub-2010 Teachers Retirees Below Median		

#### Adjustments:

Age	Factor
< 83	96%
83	98%
84	100%
85	102%
86	104%
87 +	106%

Group	Gender	Table	Set Back	Set Forward
Teachers	Female	Pub-2010 Teachers Retirees Below Median		

#### Adjustments:

Age	Factor
< 81	100%
81	101%
82	102%
83	103%
84	104%
85 +	105%

### Post - Disablement

Group	Gender	Table	Set Back	Set Forward
Teachers/General/Other Edu	Male	Pub-2010 General Disabled Retirees		3 years
Teachers/General/Other Edu	Female	Pub-2010 General Disabled Retirees	1 year	

### Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
All	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
All	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

### Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
Teachers/General/Other Edu	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

# Summary of Assumptions

**Plan**  
**TSERS:**  
**-Teachers**  
 -General Employees  
 -Other Education  
 -Law Enforcement  
 CJRS  
 LRS  
 National Guard  
 DIPNC  
 FRSWPF  
 LGERS:  
 -General Employees  
 -Fire & Rescue  
 -Law Enforcement  
 RODs  
 Death

## Retirement

Male	Service						
Age	5	10	15	20	25	30	35
50				0.030	0.030	0.700	0.700
55				0.045	0.030	0.400	0.450
60	0.085	0.080	0.100	0.100	0.300	0.400	0.300
65	0.175	0.225	0.250	0.325	0.400	0.300	0.250
70	0.175	0.225	0.250	0.250	0.250	0.150	0.300
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Female	Service						
Age	5	10	15	20	25	30	35
50				0.050	0.045	0.650	0.750
55				0.050	0.045	0.400	0.375
60	0.080	0.100	0.100	0.130	0.250	0.500	0.375
65	0.250	0.300	0.250	0.350	0.475	0.450	0.400
70	0.225	0.250	0.300	0.300	0.300	0.400	0.325
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

## Termination

Service	Male	Female
0	0.0500	0.0350
1	0.1750	0.1650
2	0.1550	0.1550
3	0.1450	0.1375
4	0.1150	0.1150

## After 5 years of membership in the system:

Age	Male	Female
25	0.3000	0.3500
30	0.0900	0.1000
35	0.0600	0.0575
40	0.0475	0.0400
45	0.0375	0.0350
50	0.0425	0.0400
55	0.0425	0.0400
60	0.0425	0.0400

# Summary of Assumptions

- Plan**
- TSERS:**
- Teachers
  - General Employees**
  - Other Education**
  - Law Enforcement
  - CJRS
  - LRS
  - National Guard
  - DIPNC
  - FRSWPF
  - LGERS:
  - General Employees
  - Fire & Rescue
  - Law Enforcement
  - RODs
  - Death

## Mortality

### Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
General/Other Educators	Male	Pub-2010 General Retirees		

#### Adjustments:

Age	Factor
All	105.50%

Group	Gender	Table	Set Back	Set Forward
General/Other Educators	Female	Pub-2010 General Retirees		

#### Adjustments:

Age	Factor
< 76	95%
76	96%
77	97%
78	98%
79	99%
80	100%
81	101%
82	102%
83	103%
84	104%
85	105%
86	106%
87	107%
88	108%
89	109%
90+	110%

### Post - Disablement

Group	Gender	Table	Set Back	Set Forward
Teachers/General/Other Edu	Male	Pub-2010 General Disabled Retirees		3 years
Teachers/General/Other Edu	Female	Pub-2010 General Disabled Retirees	1 year	

### Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
All	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
All	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

### Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
Teachers/General/Other Edu	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

# Summary of Assumptions

Plan  
**TSERS:**  
 -Teachers  
**-General Employees**  
 -Other Education  
 -Law Enforcement  
 CJRS  
 LRS  
 National Guard  
 DIPNC  
 FRSWPF  
 LGERS:  
 -General Employees  
 -Fire & Rescue  
 -Law Enforcement  
 RODs  
 Death

## Retirement

Male	Service						
Age	5	10	15	20	25	30	35
50				0.030	0.040	0.600	0.600
55				0.030	0.040	0.400	0.350
60	0.090	0.070	0.070	0.100	0.225	0.400	0.270
65	0.180	0.250	0.250	0.300	0.400	0.275	0.300
70	0.180	0.250	0.225	0.225	0.250	0.300	0.300
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Female	Service						
Age	5	10	15	20	25	30	35
50				0.035	0.040	0.400	0.400
55				0.040	0.040	0.400	0.250
60	0.070	0.080	0.090	0.095	0.200	0.400	0.250
65	0.200	0.250	0.300	0.300	0.350	0.350	0.300
70	0.150	0.200	0.225	0.250	0.350	0.300	0.300
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

## Termination

Service	Male	Female
0	0.0900	0.0900
1	0.1700	0.1750
2	0.1500	0.1575
3	0.1250	0.1400
4	0.1100	0.1150

## After 5 years of membership in the system:

Age	Male	Female
25	0.2500	0.2500
30	0.1250	0.1200
35	0.0750	0.1000
40	0.0500	0.0575
45	0.0400	0.0400
50	0.0400	0.0400
55	0.0400	0.0400
60	0.0400	0.0400

# Summary of Assumptions

**Plan**  
**TSERS:**  
 -Teachers  
 -General Employees  
**-Other Education**  
 -Law Enforcement  
 CJRS  
 LRS  
 National Guard  
 DIPNC  
 FRSWPF  
 LGERS:  
 -General Employees  
 -Fire & Rescue  
 -Law Enforcement  
 RODs  
 Death

## Retirement

Male	Service						
Age	5	10	15	20	25	30	35
50				0.035	0.045	0.500	0.500
55				0.040	0.050	0.300	0.300
60	0.080	0.070	0.100	0.090	0.200	0.300	0.275
65	0.100	0.250	0.250	0.300	0.275	0.250	0.275
70	0.100	0.250	0.250	0.225	0.300	0.250	0.350
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Female	Service						
Age	5	10	15	20	25	30	35
50				0.045	0.045	0.400	0.500
55				0.045	0.060	0.300	0.300
60	0.070	0.090	0.100	0.100	0.300	0.375	0.300
65	0.175	0.250	0.250	0.300	0.350	0.300	0.350
70	0.150	0.200	0.225	0.200	0.275	0.200	0.350
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

## Termination

Service	Male	Female
0	0.0900	0.0700
1	0.1900	0.1750
2	0.1700	0.1550
3	0.1300	0.1250
4	0.1100	0.1075

## After 5 years of membership in the system:

Age	Male	Female
25	0.2500	0.2500
30	0.1000	0.1500
35	0.0550	0.0750
40	0.0500	0.0650
45	0.0500	0.0475
50	0.0500	0.0450
55	0.0400	0.0350
60	0.0400	0.0350

# Summary of Assumptions

**Plan**  
**TSERS:**  
 -Teachers  
 -General Employees  
 -Other Education  
**-Law Enforcement**  
 CJRS  
 LRS  
 National Guard  
 DIPNC  
 FRSWPF  
 LGERS:  
 -General Employees  
 -Fire & Rescue  
 -Law Enforcement  
 RODs  
 Death

## Mortality

### Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
LEO	Male/Female	Pub-2010 Safety Retirees		1 year

#### Adjustments:

Age	Factor
All	97.00%

We combined the experience of the TSERS LEOs, LGERS LEOs and LGERS Fire/Safety to come up with the public safety rates.

### Post - Disablement

Group	Gender	Table	Set Back	Set Forward
LEO	Male/Female	Pub-2010 General Disabled Retirees	3 years	

### Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
All	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
All	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

### Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
LEO	Male/Female	Pub-2010 Safety Employees		

All mortality tables are benefits weighted

# Summary of Assumptions

**Plan**  
**TSERS:**  
 -Teachers  
 -General Employees  
 -Other Education  
**-Law Enforcement**  
 CJRS  
 LRS  
 National Guard  
 DIPNC  
 FRSWPF  
 LGERS:  
 -General Employees  
 -Fire & Rescue  
 -Law Enforcement  
 RODs  
 Death

## Retirement

Age	Service						
	5	10	15	20	25	30	35
50			0.040	0.050	0.050	0.900	0.800
55	0.200	0.200	0.350	0.350	0.500	0.900	0.650
60	0.100	0.200	0.125	0.250	0.250	0.500	0.500
65	0.150	0.450	0.250	0.250	0.250	0.500	0.500
70	0.250	0.150	0.250	0.250	0.250	0.250	0.500
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000

## Termination

Service	Rate
0	0.0350
1	0.0925
2	0.0925
3	0.0950
4	0.0800

## After 5 years of membership in the system:

Age	Rate
25	0.0750
30	0.0750
35	0.0350
40	0.0250
45	0.0200
50	0.0200

# Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

## Salary Merit Scale

Service	Teachers	General	Other EDU	LEO
0	4.05%	3.00%	4.25%	4.80%
5	2.87%	1.80%	2.65%	3.10%
10	2.04%	1.10%	1.85%	2.00%
15	1.13%	0.60%	1.33%	0.80%
20	0.00%	0.50%	0.83%	0.80%
25	0.00%	0.40%	0.33%	0.80%
30	0.00%	0.00%	0.00%	0.40%
>=35	0.00%	0.00%	0.00%	0.00%

# Summary of Assumptions

Plan

TSERS:

-Teachers

-General Employees

-Other Education

-Law Enforcement

CJRS

LRS

National Guard

DIPNC

FRSWPF

LGERS:

-General Employees

-Fire & Rescue

-Law Enforcement

RODs

Death

## Mortality

### Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Retirees Above Median		

### Post - Disablement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Disabled Retirees		

### Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Contingent Annuitant		

### Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

# Summary of Assumptions

**Plan**  
 TSERS:  
 -Teachers  
 -General Employees  
 -Other Education  
 -Law Enforcement  
**CJRS**  
 LRS  
 National Guard  
 DIPNC  
 FRSWPF  
 LGERS:  
 -General Employees  
 -Fire & Rescue  
 -Law Enforcement  
 RODs  
 Death

## Retirement

Age	Service					
	5	10	15	20	24	25+
50	0.020	0.020	0.020	0.020	0.150	0.090
55	0.020	0.020	0.020	0.020	0.050	0.090
60	0.040	0.040	0.040	0.040	0.200	0.170
65	0.120	0.120	0.120	0.120	0.120	0.120
70	0.250	0.250	0.250	0.250	0.250	0.250
72	1.000	1.000	1.000	1.000	1.000	1.000

## Salary Merit Scale

Service	Rates
0	1.50%
5	1.00%
10	0.50%
>=15	0.00%

## Termination

Age	Rate
20	0.020
25	0.020
30	0.020
35	0.020
40	0.020
45	0.020
50	0.020
55	0.020
60	0.020
65	0.020
70	0.020

## Disability

Age	Rate
25	0.00002
30	0.00003
35	0.00008
40	0.00017
45	0.00035
50	0.00059
55	0.00119
60	0.00192

# Summary of Assumptions

**Plan**  
TSERS:  
-Teachers  
-General Employees  
-Other Education  
-Law Enforcement  
CJRS  
**LRS**  
National Guard  
DIPNC  
FRSWPF  
LGERS:  
-General Employees  
-Fire & Rescue  
-Law Enforcement  
RODs  
Death

## Mortality

### Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Retirees Above Median		

### Post - Disablement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Disabled Retirees		

### Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Contingent Annuitant		

### Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

# Summary of Assumptions

- Plan**
- TSERS:
  - Teachers
  - General Employees
  - Other Education
  - Law Enforcement
  - CJRS
  - LRS**
  - National Guard
  - DIPNC
  - FRSWPF
  - LGERS:
  - General Employees
  - Fire & Rescue
  - Law Enforcement
  - RODs
  - Death

## Retirement

Age	Rate
60	0.100
65	0.100
70	0.130
75	0.150
80	1.000

## Termination

Age	Rate
25	0.100
30	0.100
35	0.100
40	0.100
45	0.100
50	0.100
55	0.100
60	0.100
65	0.100
70	0.100
75+	0.100

## Disability

Age	Rate
25	0.000
30	0.000
35	0.001
40	0.003
45	0.005
50	0.008
55	0.014
60	0.000

# Summary of Assumptions

**Plan**  
 TSERS:  
 -Teachers  
 -General Employees  
 -Other Education  
 -Law Enforcement  
 CJRS  
 LRS  
**National Guard**  
 DIPNC  
 FRSWPF  
 LGERS:  
 -General Employees  
 -Fire & Rescue  
 -Law Enforcement  
 RODs  
 Death

## Mortality

### Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
	Male	Pub-2010 General Retirees		

Adjustments:

Age	Factor
All	105.50%

Group	Gender	Table	Set Back	Set Forward
	Female	Pub-2010 General Retirees		

Adjustments:

Age	Factor
< 76	95%
76	96%
77	97%
78	98%
79	99%
80	100%
81	101%
82	102%
83	103%
84	104%
85	105%
86	106%
87	107%
88	108%
89	109%
90+	110%

### Post - Disablement

No disabled mortality rates in this plan

### Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

### Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

# Summary of Assumptions

## Plan

TSERS:

- Teachers
- General Employees
- Other Education
- Law Enforcement
- CJRS
- LRS

## National Guard

- DIPNC
- FRSWPF
- LGERS:
- General Employees
- Fire & Rescue
- Law Enforcement
- RODs
- Death

## Retirement

Age	Rate
50	0.150
55	0.250
60	0.500
65	1.000

## Termination

Service	Rate
7-9 years	0.175
10-14 years	0.110
15-19 years	0.110
20+ years	0.150

# Summary of Assumptions

**Plan**  
 TSERS:  
 -Teachers  
 -General Employees  
 -Other Education  
 -Law Enforcement  
 CJRS  
 LRS  
 National Guard  
**DIPNC**  
 FRSWPF  
 LGERS:  
 -General Employees  
 -Fire & Rescue  
 -Law Enforcement  
 RODs  
 Death

DIPNC - uses all of the assumptions from TSERS expect for Disability

## Disability

Age	Male	Female
25	0.00018	0.00014
30	0.00029	0.00064
35	0.00059	0.00072
40	0.00084	0.00120
45	0.00123	0.00176
50	0.00230	0.00256
55	0.00230	0.00336
60	0.00346	0.00336

# Summary of Assumptions

**Plan**  
 TSERS:  
 -Teachers  
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 DIPNC  
**FRSWPF**  
 LGERS:  
 -General Employees  
 -Fire & Rescue  
 -Law Enforcement  
 RODs  
 Death

## Mortality

### Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 Safety Retirees		1 year

Adjustments:

Ages	Factor
All	97.00%

We combined the experience of the TSERS LEOs, LGERS LEOs and LGERS Fire/Safety to come up with the public safety rates.

### Post - Disablement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Disabled Retirees	3 years	

### Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

### Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 Safety Employees		

All mortality tables are benefits weighted

# Summary of Assumptions

- Plan**  
 TSERS:  
 -Teachers  
 -General Employees  
 -Other Education  
 -Law Enforcement  
 CJRS  
 LRS  
 National Guard  
 DIPNC  
**FRSWPF**  
 LGERS:  
 -General Employees  
 -Fire & Rescue  
 -Law Enforcement  
 RODs  
 Death

## Retirement

Age	Service	
	20	21+
55	0.850	0.850
56+	0.750	0.600

## Termination

Age	Service		
	< 5	5-19	20+
< 55	0.030	0.015	1.000
55	0.100	0.075	1.000

## Disability

Age	Rate
25	0.0005
30	0.0005
35	0.0008
40	0.0018
45	0.0021
50	0.0030
55	0.0036
60	0.0061

# Summary of Assumptions

**Plan**  
TSERS:  
-Teachers  
-General Employees  
-Other Education  
-Law Enforcement  
CJRS  
LRS  
National Guard  
DIPNC  
FRSWPF  
**LGERS:**  
**-General Employees**  
-Fire & Rescue  
-Law Enforcement  
RODs  
Death

## Mortality

### Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
General	Male	Pub-2010 General Retirees		2 years

#### Adjustments:

Age	Factor
< 81	96.00%
81	96.80%
82	97.60%
83	98.40%
84	99.20%
85 +	100.00%

Group	Gender	Table	Set Back	Set Forward
General	Female	Pub-2010 General Retirees		

#### Adjustments:

Age	Factor
< 92	100.00%
92	102.50%
93	105.00%
94	107.50%
95 +	110.00%

### Post - Disablement

Group	Gender	Table	Set Back	Set Forward
General	Male	Pub-2010 General Disabled Retirees		3 years
General	Female	Pub-2010 General Disabled Retirees	1 year	

### Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
General/LEO/FRW	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
General/LEO/FRW	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

### Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
General	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

# Summary of Assumptions

**Plan**  
 TSERS:  
 -Teachers  
 -General Employees  
 -Other Education  
 -Law Enforcement  
 CJRS  
 LRS  
 National Guard  
 DIPNC  
 FRSWPF  
**LGERS:**  
**-General Employees**  
 -Fire & Rescue  
 -Law Enforcement  
 RODs  
 Death

## Retirement

Male	Service						
Age	5	10	15	20	25	30	35
50				0.030	0.055	0.400	0.400
55				0.030	0.055	0.350	0.250
60	0.080	0.070	0.070	0.075	0.200	0.400	0.225
65	0.250	0.250	0.275	0.325	0.300	0.350	0.300
70	0.200	0.250	0.200	0.275	0.300	0.350	0.300
75	0.250	0.200	0.300	0.275	0.300	0.350	0.300
80+	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Female	Service						
Age	5	10	15	20	25	30	35
50				0.035	0.050	0.400	0.450
55				0.050	0.055	0.300	0.300
60	0.080	0.090	0.070	0.100	0.250	0.375	0.250
65	0.250	0.250	0.350	0.350	0.350	0.350	0.300
70	0.200	0.250	0.225	0.300	0.200	0.300	0.250
75	0.200	0.200	0.225	0.300	0.200	0.250	0.250
80+	1.000	1.000	1.000	1.000	1.000	1.000	1.000

## Termination

Service	Male	Female
0	0.1100	0.1100
1	0.1750	0.1750
2	0.1500	0.1550
3	0.1250	0.1300
4	0.1050	0.1150

## After 5 years of membership in the system:

Age	Male	Female
25	0.1200	0.1750
30	0.0750	0.1100
35	0.0550	0.0900
40	0.0550	0.0700
45	0.0425	0.0500
50	0.0425	0.0450
55	0.0425	0.0450
60	0.0425	0.0450

## Disability

Age	Male	Female
25	0.0004	0.0005
30	0.0005	0.0005
35	0.0005	0.0005
40	0.0010	0.0005
45	0.0020	0.0015
50	0.0030	0.0030
55	0.0050	0.0045
60	0.0065	0.0045

# Summary of Assumptions

**Plan**  
 TSERS:  
 -Teachers  
 -General Employees  
 -Other Education  
 -Law Enforcement  
 CJRS  
 LRS  
 National Guard  
 DIPNC  
 FRSWPF  
**LGERS:**  
 -General Employees  
**-Fire & Rescue**  
**-Law Enforcement**  
 RODs  
 Death

## Mortality

### Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
LEO/FRW	Male/Female	Pub-2010 Safety Retirees		1 year

#### Adjustments:

Age	Factor
All	97.00%

We combined the experience of the TSERS LEOs, LGERS LEOs and LGERS Fire/Safety to come up with the public safety rates.

### Post - Disablement

Group	Gender	Table	Set Back	Set Forward
LEO/FRW	Male/Female	Pub-2010 General Disabled Retirees	3 years	

### Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
General/LEO/FRW	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
General/LEO/FRW	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

### Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
LEO/FRW	Male/Female	Pub-2010 Safety Employees		

All mortality tables are benefits weighted

# Summary of Assumptions

**Plan**  
 TSERS:  
 -Teachers  
 -General Employees  
 -Other Education  
 -Law Enforcement  
 CJRS  
 LRS  
 National Guard  
 DIPNC  
 FRSWPF  
**LGERS:**  
 -General Employees  
**-Fire & Rescue**  
 -Law Enforcement  
 RODs  
 Death

Retirement							
Age	Service						
	5	10	15	20	25	30	35
50				0.033	0.043	0.550	0.500
55	0.120	0.0575	0.0575	0.033	0.043	0.550	0.400
60	0.100	0.058	0.058	0.125	0.350	0.600	0.400
65	0.100	0.250	0.250	0.250	0.350	0.500	0.325
70	0.320	0.250	0.250	0.250	0.350	0.500	0.325
75+	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Termination	
Service	Rate
0	0.0750
1	0.1250
2	0.1100
3	0.1000
4	0.1000

Disability		
Age	Male	Female
25	0.0006	0.0006
30	0.0010	0.0009
35	0.0007	0.0024
40	0.0040	0.0038
45	0.0040	0.0048
50	0.0080	0.0076
55	0.0120	0.0176
60	0.0150	0.0276

After 5 years of membership in the system:

Age	Rate
25	0.0700
30	0.0700
35	0.0500
40	0.0400
45	0.0350
50	0.0500
55	0.0500

# Summary of Assumptions

Plan

TSERS:

-Teachers

-General Employees

-Other Education

-Law Enforcement

CJRS

LRS

National Guard

DIPNC

FRSWPF

LGERS:

-General Employees

-Fire & Rescue

-Law Enforcement

RODs

Death

Retirement							
Age	Service						
	5	10	15	20	25	30	35
50			0.04	0.033	0.030	0.900	0.825
55	0.175	0.225	0.300	0.375	0.550	0.900	0.500
60	0.175	0.150	0.125	0.250	0.250	0.350	0.250
65	0.350	0.200	0.250	0.250	0.250	0.350	0.300
70	0.150	0.350	0.400	0.250	0.400	0.350	0.275
75+	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Termination	
Service	Rate
0	0.0900
1	0.0875
2	0.0900
3	0.0925
4	0.0725

Disability		
Age	Male	Female
25	0.0006	0.0025
30	0.0010	0.0030
35	0.0020	0.0040
40	0.0030	0.0050
45	0.0040	0.0060
50	0.0040	0.0070
55	0.0040	0.0070
60	0.0040	0.0070

After 5 years of membership in the system:	
Age	Rate
25	0.1000
30	0.0600
35	0.0600
40	0.0400
45	0.0300
50	0.0450
55	0.0000

# Summary of Assumptions

**Plan**  
 TSERS:  
 -Teachers  
 -General Employees  
 -Other Education  
 -Law Enforcement  
 CJRS  
 LRS  
 National Guard  
 DIPNC  
 FRSWPF  
**LGERS:**  
 -General Employees  
 -Fire & Rescue  
 -Law Enforcement  
 RODs  
 Death

## Salary Merit Scale

Service	General	LEO	FRW
0	5.00%	4.50%	4.75%
5	2.70%	2.60%	2.65%
10	1.73%	1.81%	1.68%
15	1.08%	1.36%	1.03%
20	0.69%	1.10%	0.64%
25	0.55%	0.85%	0.50%
30	0.55%	0.60%	0.50%
35	0.00%	0.35%	0.50%
>=40	0.00%	0.00%	0.00%

# Summary of Assumptions

**Plan**  
TSERS:  
-Teachers  
-General Employees  
-Other Education  
-Law Enforcement  
CJRS  
LRS  
National Guard  
DIPNC  
FRSWPF  
LGERS:  
-General Employees  
-Fire & Rescue  
-Law Enforcement  
**RODs**  
Death

## Mortality

### Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
	Male	Pub-2010 General Retirees		2 years

Adjustments:	Age	Factor
	< 81	96.00%
	81	96.80%
	82	97.60%
	83	98.40%
	84	99.20%
	85 +	100.00%

Group	Gender	Table	Set Back	Set Forward
	Female	Pub-2010 General Retirees		

Adjustments:	Age	Factor
	< 92	100.00%
	92	102.50%
	93	105.00%
	94	107.50%
	95 +	110.00%

### Post - Disablement

Group	Gender	Table	Set Back	Set Forward
	Male	Pub-2010 General Disabled Retirees		3 years
	Female	Pub-2010 General Disabled Retirees	1 year	

### Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

### Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

# Summary of Assumptions

**Plan**  
 TSERS:  
 -Teachers  
 -General Employees  
 -Other Education  
 -Law Enforcement  
 CJRS  
 LRS  
 National Guard  
 DIPNC  
 FRSWPF  
 LGERS:  
 -General Employees  
 -Fire & Rescue  
 -Law Enforcement  
**RODs**  
 Death

## Retirement

Male	Service						
Age	5	10	15	20	25	30	35
50				0.030	0.055	0.400	0.400
55				0.030	0.055	0.350	0.250
60	0.080	0.070	0.070	0.075	0.200	0.400	0.225
65	0.250	0.250	0.275	0.325	0.300	0.350	0.300
70	0.200	0.250	0.200	0.275	0.300	0.350	0.300
75	0.250	0.200	0.300	0.275	0.300	0.350	0.300
80+	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Female	Service						
Age	5	10	15	20	25	30	35
50				0.035	0.050	0.400	0.450
55				0.050	0.055	0.300	0.300
60	0.080	0.090	0.070	0.100	0.250	0.375	0.250
65	0.250	0.250	0.350	0.350	0.350	0.350	0.300
70	0.200	0.250	0.225	0.300	0.200	0.300	0.250
75	0.200	0.200	0.225	0.300	0.200	0.250	0.250
80+	1.000	1.000	1.000	1.000	1.000	1.000	1.000

## Disability

Age	Male	Female
25	0.0004	0.0005
30	0.0005	0.0005
35	0.0005	0.0005
40	0.0010	0.0005
45	0.0020	0.0015
50	0.0030	0.0030
55	0.0050	0.0045
60	0.0065	0.0045

## Termination

Service	Male	Female
0	0.1100	0.1100
1	0.1750	0.1750
2	0.1500	0.1550
3	0.1250	0.1300
4	0.1050	0.1150

## After 5 years of membership in the system:

Age	Male	Female
25	0.1200	0.1750
30	0.0750	0.1100
35	0.0550	0.0900
40	0.0550	0.0700
45	0.0425	0.0500
50	0.0425	0.0450
55	0.0425	0.0450
60	0.0425	0.0450

## Salary Merit Scale

Service	Rate
0	5.00%
5	2.70%
10	1.73%
15	1.08%
20	0.69%
25	0.55%
30	0.55%
35	0.00%
>=40	0.00%

# Summary of Assumptions

## Plan

TSERS:

- Teachers
- General Employees
- Other Education
- Law Enforcement

CJRS

LRS

National Guard

DIPNC

FRSWPF

LGERS:

- General Employees
- Fire & Rescue
- Law Enforcement

RODs

Death

**The Death Benefits Plan uses the assumptions from the underlying plans**

# Support for Proposed Assumptions

# Mortality

- Mortality tables vary by age, gender, employee group and health status
  - Current retiree mortality rates are based on RP-2014 tables adjusted to reflect various TSERS and LGERS populations
  - Since last review, public sector tables, collectively known as PUB2010, have been released. These tables were a much better fit, requiring less adjustment.
  - The change in rates did not change results significantly
  - Mortality experience for CJRS and LRS did not fit experience. A standard PUB2010 table with longer life expectancy was used.
- Mortality assumption includes provision to reflect future mortality improvements
  - Current assumption based on mortality projection scale MP-2015
  - Since last review, mortality has increased compared to that predicted by MP-2015. The most recent scale, MP-2019, represents the five straight years of increasing mortality
  - The change to MP-2019 does decrease costs

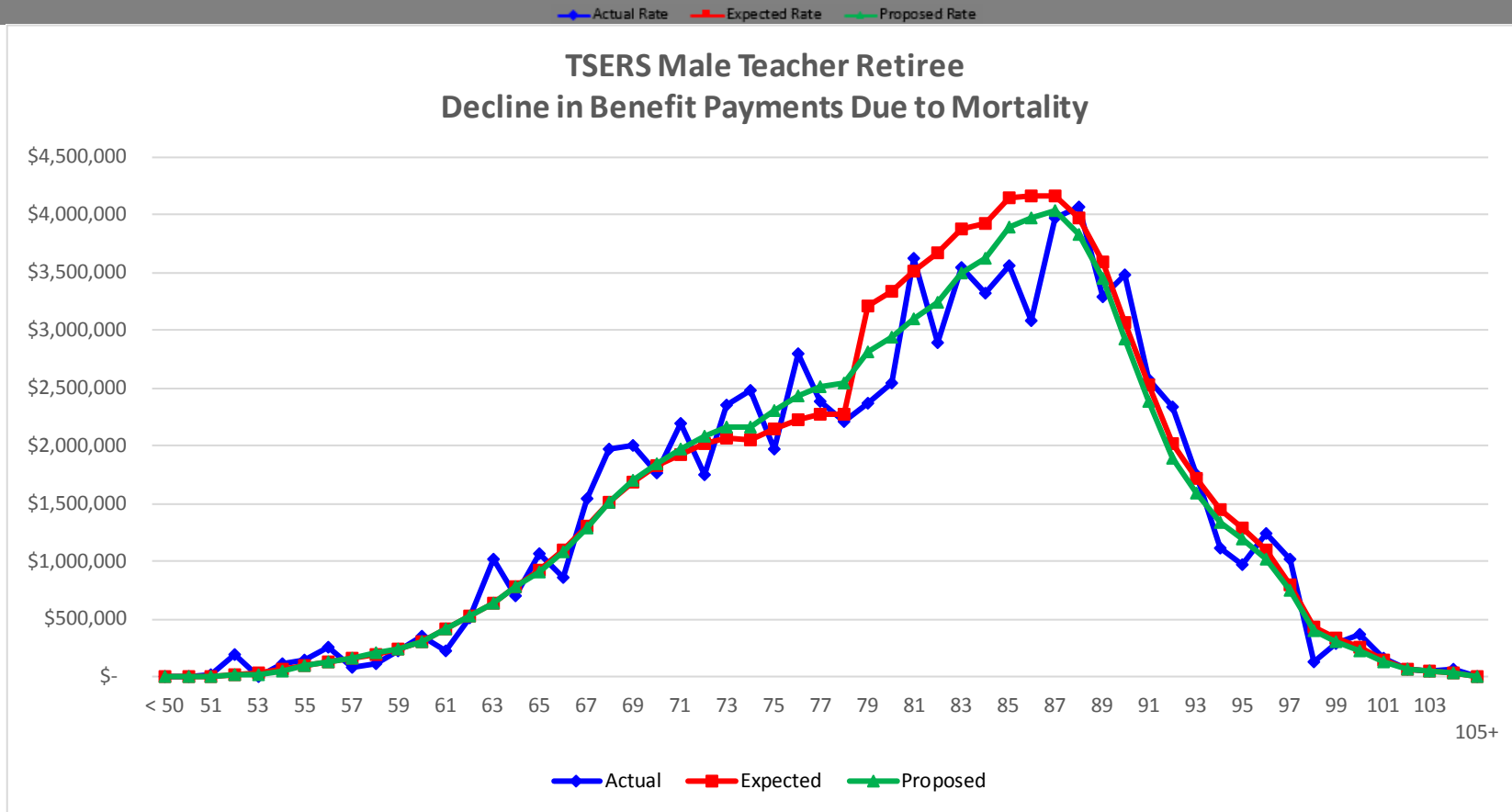
# Mortality

- The following mortality assumptions make use of standard tables because they are not a big driver of costs and there is not sufficient warrant adjusting the table:
  - Mortality for actives is not a big driver of costs because of the relatively low number of deaths and the potentially lower amount of benefits than had the member retired.
  - Mortality for disabled similarly due to infrequency of disability relative to other benefits
  - Mortality for beneficiaries was based across the whole population to give creditability to the data.

# Mortality

## Decline in Benefit Payments Due To Mortality

- Plan**
- TSERS:**
- Teachers
  - General Employees
  - Other Education
  - Law Enforcement
  - CJRS
  - LRS
  - National Guard
  - DIPNC
  - FRSWPF
  - LGERS:
  - General Employees
  - Fire & Rescue
  - Law Enforcement
  - RODs
  - Death
  - Membership
  - Active
- Retiree**
- Disabled
  - Beneficiary
  - Gender
- Males**
- Females
  - Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	83.29	85.97	0.9688	82.93	1.0043	
Total	83.29	85.97	0.9688	82.93	1.0043	Recommendation: adjust rates, generally down wards to reflect actual experience Impact: increase

# Mortality

## Decline in Benefit Payments Due To Mortality

**Plan**

**TSERS:**

**-Teachers**

-General Employees

-Other Education

-Law Enforcement

CJRS

LRS

National Guard

DIPNC

FRSWPF

LGERS:

-General Employees

-Fire & Rescue

-Law Enforcement

RODs

Death

Membership

Active

**Retiree**

Disabled

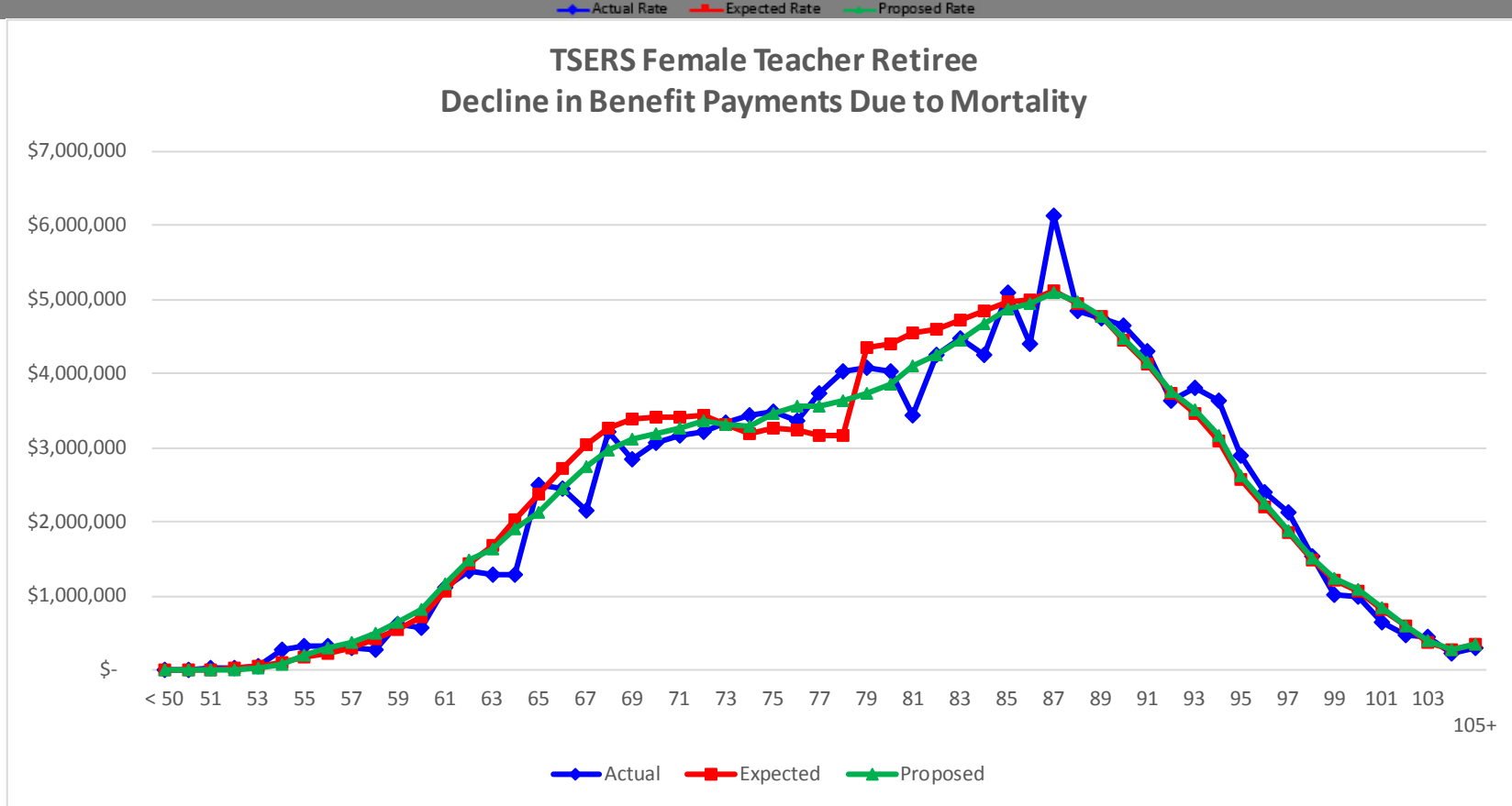
Beneficiary

Gender

Males

**Females**

Males and Females

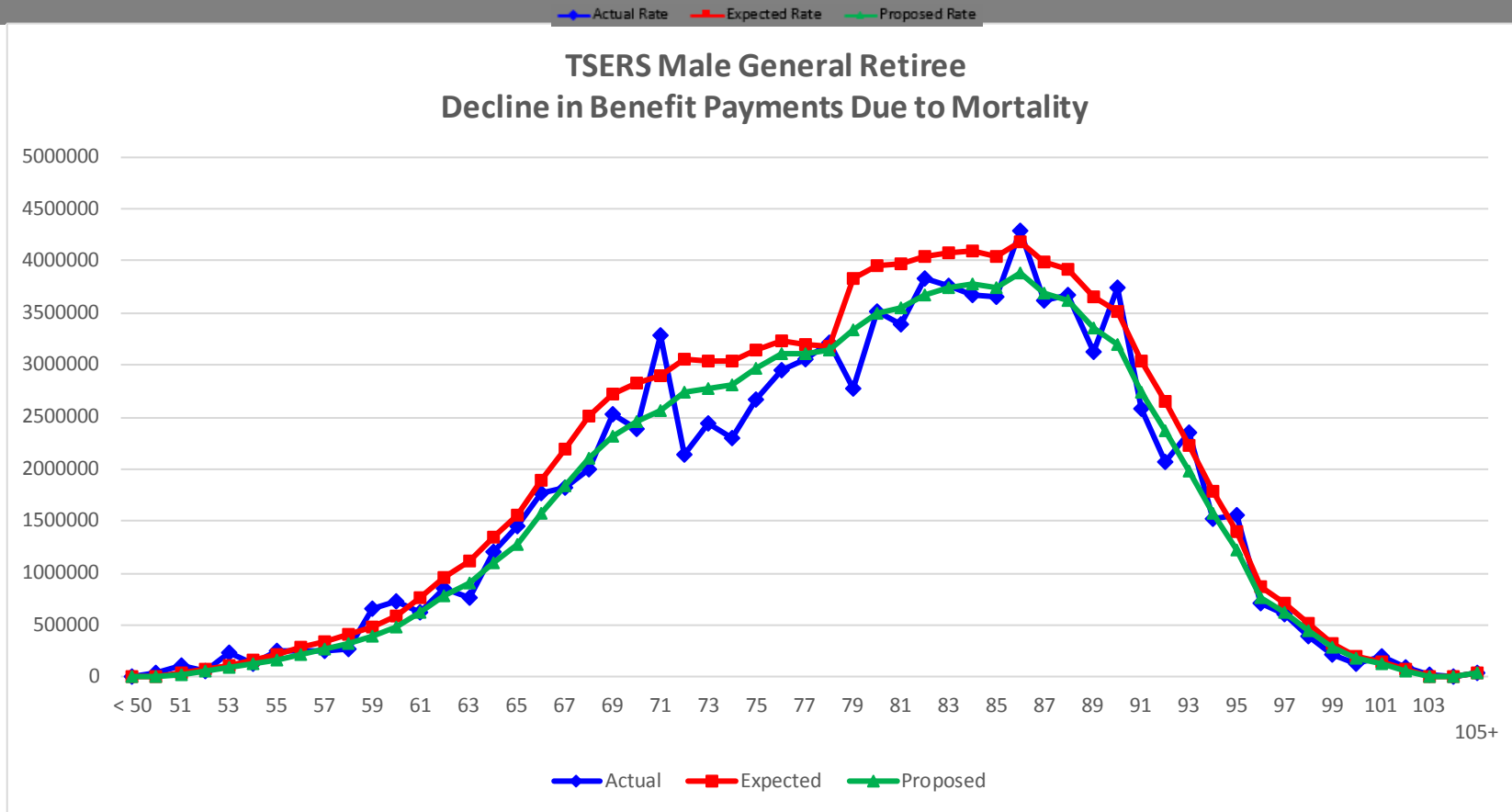


	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	134.92	137.34	0.9824	135.21	0.9978	
Total	134.92	137.34	0.9824	135.21	0.9978	Recommendation: adjust rates, generally down wards to reflect actual experience
						Impact: increase

# Mortality

## Decline in Benefit Payments Due To Mortality

- Plan**
- TSERS:**
- Teachers
  - General Employees
  - Other Education
  - Law Enforcement
  - CJRS
  - LRS
- National Guard**
- DIPNC
  - FRSWPF
  - LGERS:
  - General Employees
  - Fire & Rescue
  - Law Enforcement
  - RODs
  - Death
  - Membership
  - Active
- Retiree**
- Disabled
  - Beneficiary
  - Gender
- Males**
- Females
  - Males and Females

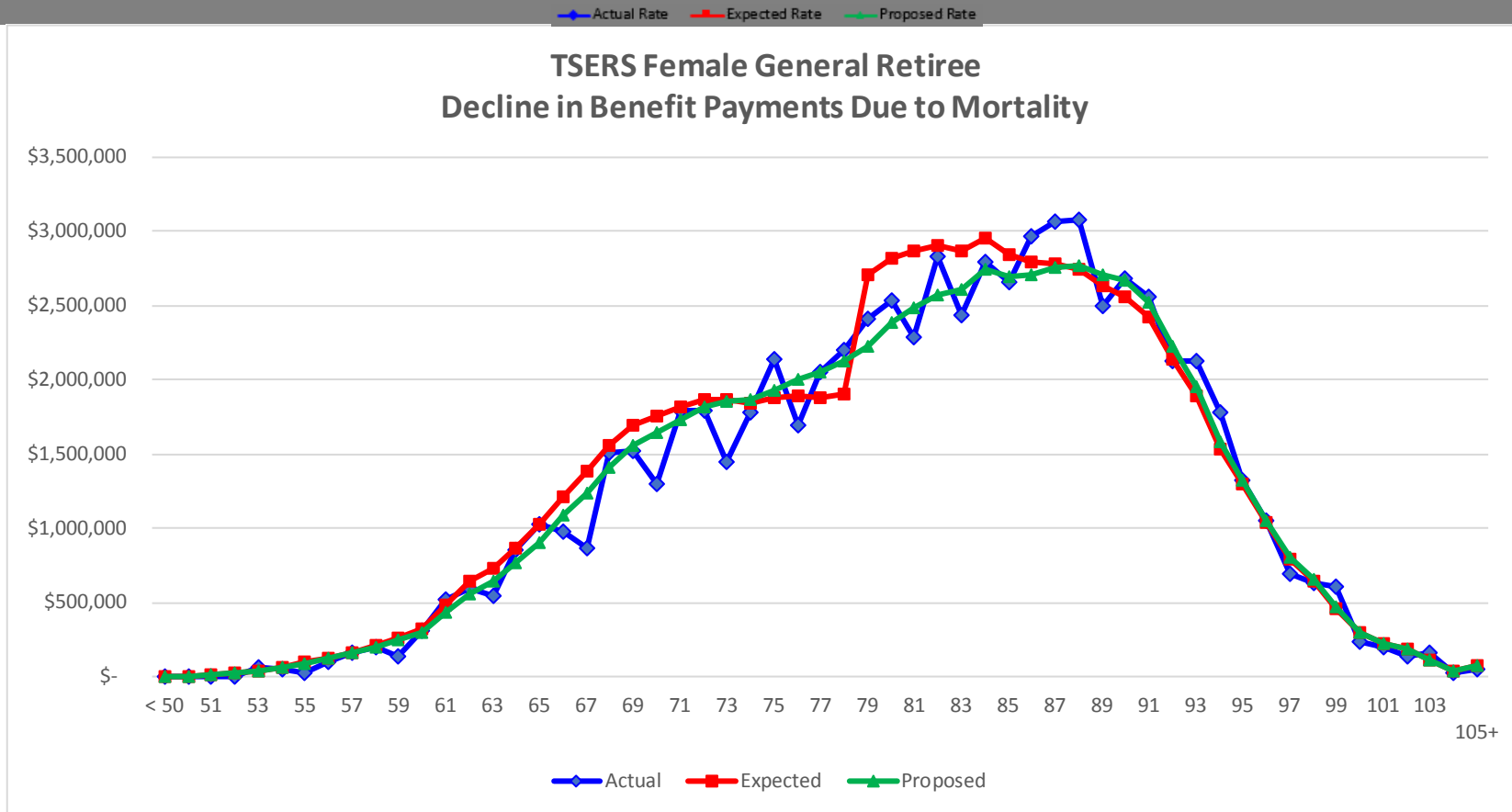


	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	96.00	106.79	0.8990	95.89	1.0011	
Total	96.00	106.79	0.8990	95.89	1.0011	Recommendation: adjust rates, generally down wards to reflect actual experience Impact: increase

# Mortality

## Decline in Benefit Payments Due To Mortality

- Plan**
- TSERS:**
- Teachers
  - General Employees
  - Other Education
  - Law Enforcement
  - CJRS
  - LRS
- National Guard**
- DIPNC
  - FRSWPF
  - LGERS:
  - General Employees
  - Fire & Rescue
  - Law Enforcement
  - RODs
  - Death
  - Membership
  - Active
- Retiree**
- Disabled
  - Beneficiary
  - Gender
  - Males
- Females**
- Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	71.69	74.38	0.9638	71.84	0.9979	
Total	71.69	74.38	0.9638	71.84	0.9979	Recommendation: adjust rates, generally down wards to reflect actual experience
						Impact: increase

# Mortality

## Decline in Benefit Payments Due To Mortality

**Plan**

**TSERS:**

- Teachers
- General Employees
- Other Education

**-Law Enforcement**

- CJRS
- LRS
- National Guard
- DIPNC

**FRSWPF**

**LGERS:**

- General Employees

**-Fire & Rescue**

**-Law Enforcement**

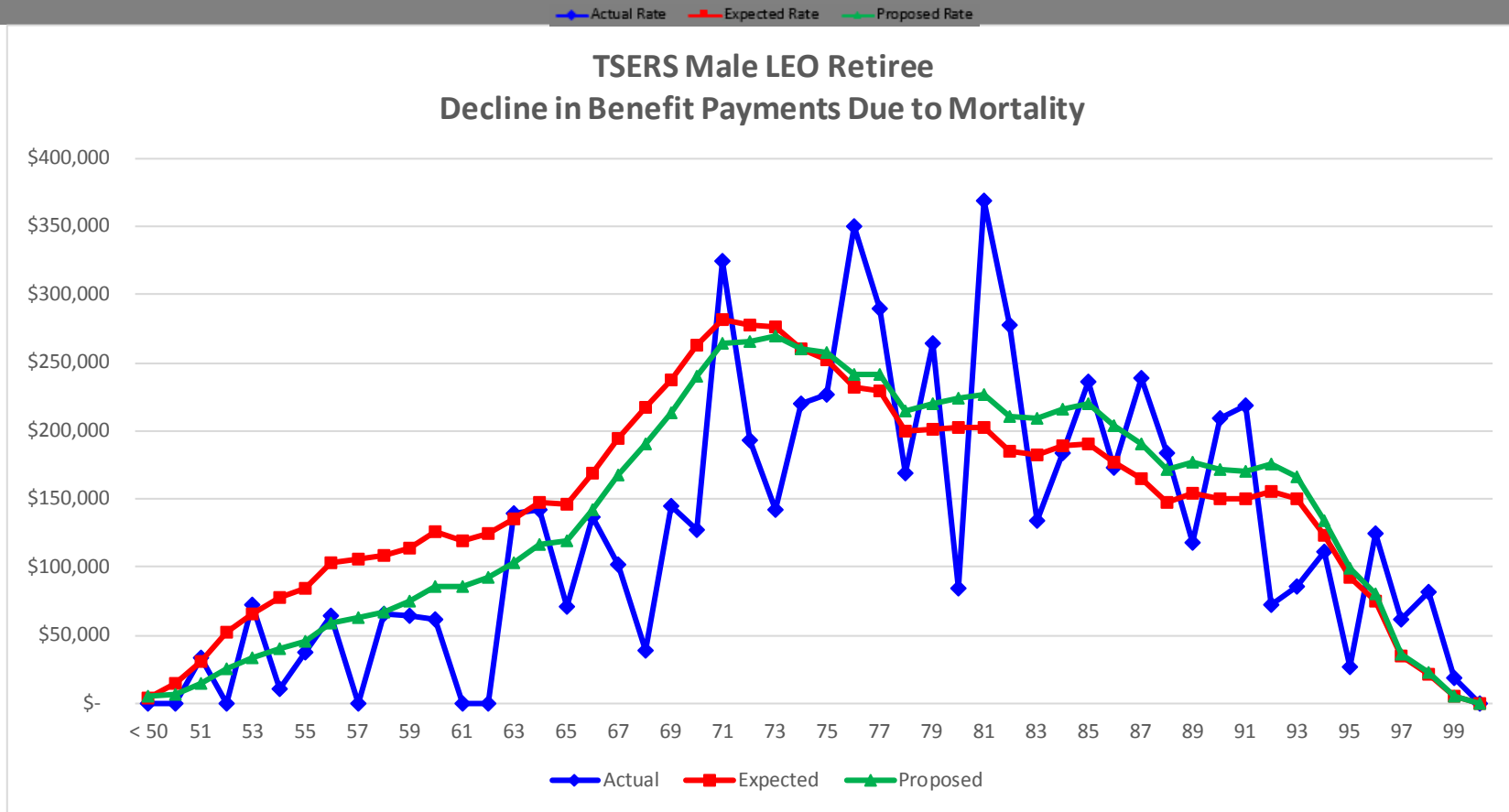
- RODs
- Death
- Membership
- Active

**Retiree**

- Disabled
- Beneficiary
- Gender

**Males**

- Females
- Males and Females

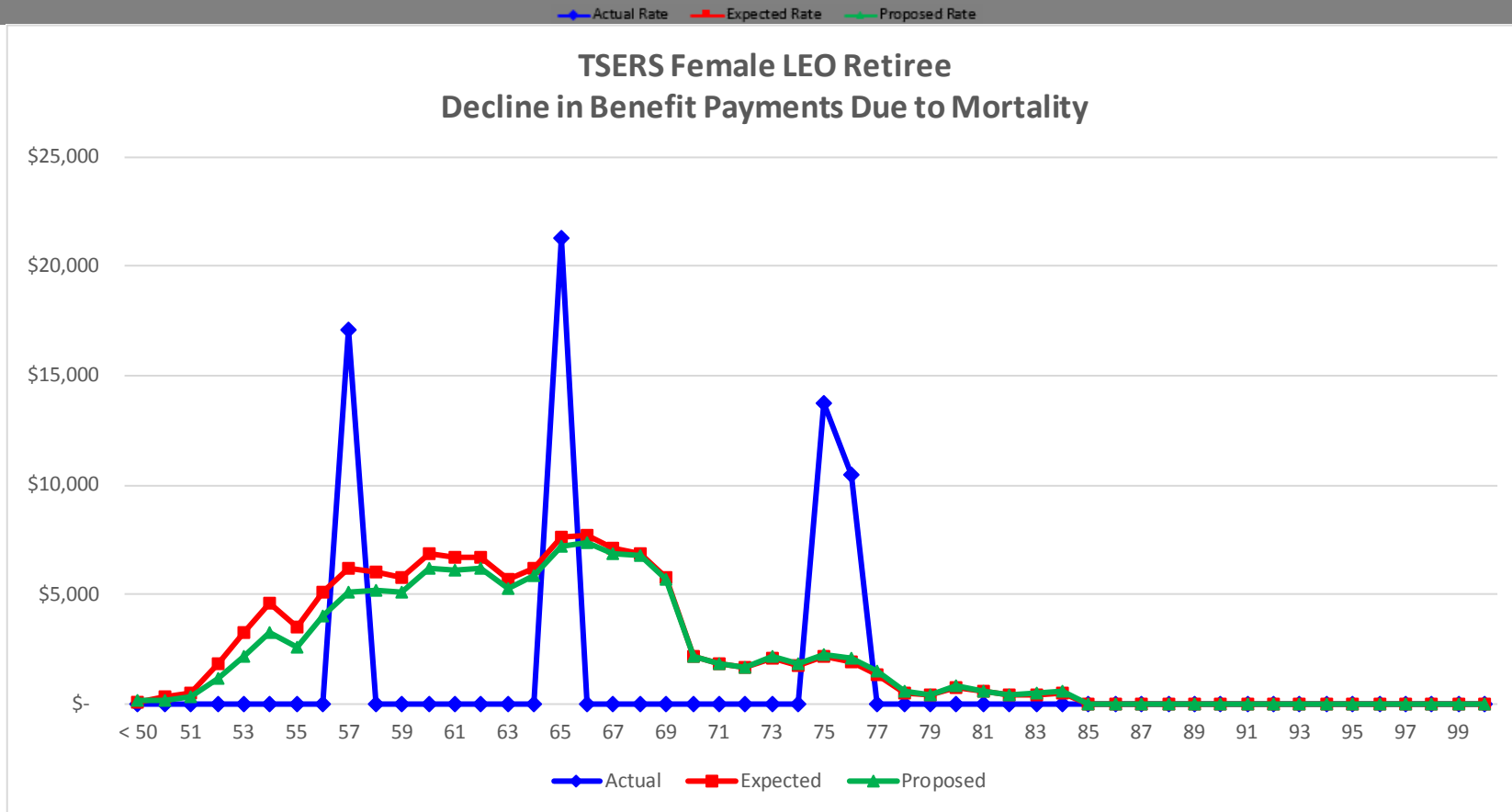


	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	6.50	7.62	0.8540	7.34	0.8855	
Total	6.50	7.62	0.8540	7.34	0.8855	Recommendation: adjust rates, generally down wards to reflect actual experience Impact: increase

# Mortality

## Decline in Benefit Payments Due To Mortality

- Plan**
- TSERS:**
- Teachers
  - General Employees
  - Other Education
- Law Enforcement**
- CJRS
  - LRS
  - National Guard
  - DIPNC
- FRSWPF**
- LGERS:**
- General Employees
- Fire & Rescue**
- Law Enforcement**
- RODs
  - Death
  - Membership
  - Active
- Retiree**
- Disabled
  - Beneficiary
  - Gender
  - Males
- Females**
- Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	0.06	0.12	0.5084	0.11	0.5568	
Total	0.06	0.12	0.5084	0.11	0.5568	Recommendation: adjust rates, generally down wards to reflect actual experience
						Impact: slight decrease

# Mortality

## Decline in Benefit Payments Due To Mortality

### Plan

TSERS:  
-Teachers  
-General Employees  
-Other Education  
-Law Enforcement  
CJRS  
LRS  
National Guard  
DIPNC  
FRSWPF

### LGERS:

#### -General Employees

-Fire & Rescue  
-Law Enforcement

### RODs

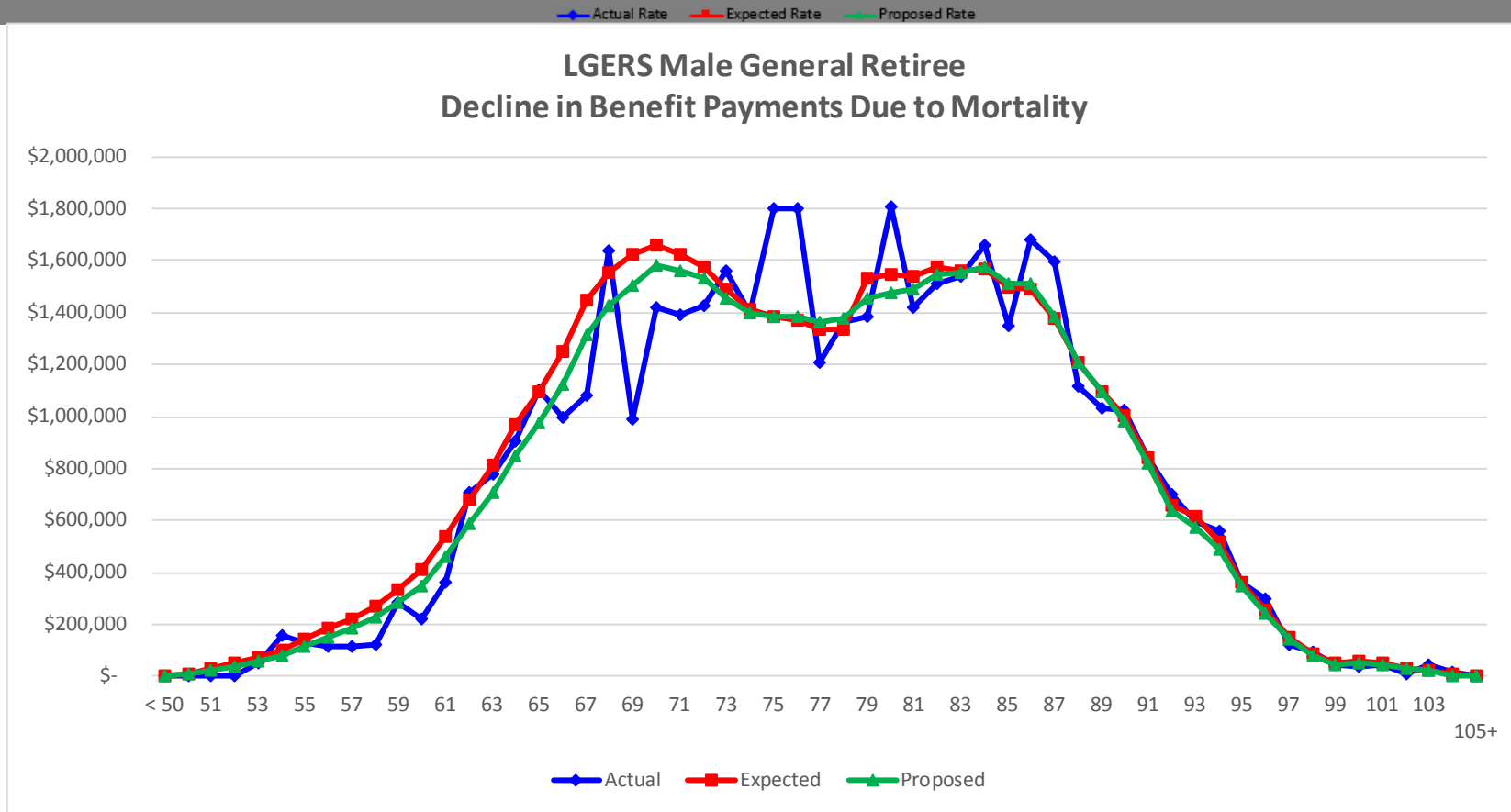
Death  
Membership  
Active

### Retiree

Disabled  
Beneficiary  
Gender

### Males

Females  
Males and Females

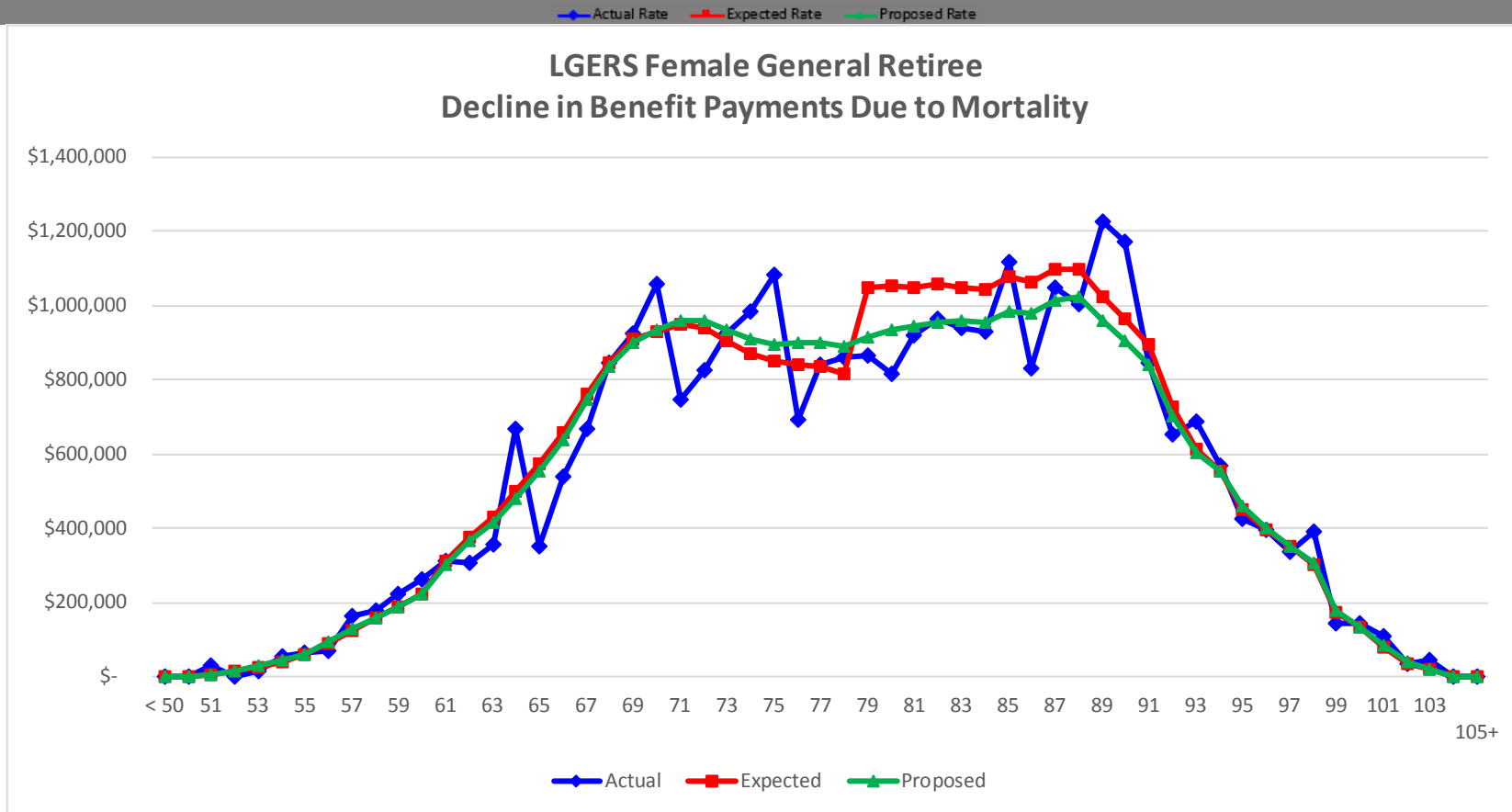


	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	44.04	45.72	0.9633	43.87	1.0038	
Total	44.04	45.72	0.9633	43.87	1.0038	Recommendation: adjust rates, generally down wards to reflect actual experience Impact: slight decrease

# Mortality

## Decline in Benefit Payments Due To Mortality

- Plan**
- TSERS:
  - Teachers
  - General Employees
  - Other Education
  - Law Enforcement
  - CJRS
  - LRS
  - National Guard
  - DIPNC
  - FRSWPF
- LGERS:**
- General Employees
  - Fire & Rescue
  - Law Enforcement
- RODs**
- Death
  - Membership
  - Active
- Retiree**
- Disabled
  - Beneficiary
  - Gender
  - Males
- Females**
- Males and Females

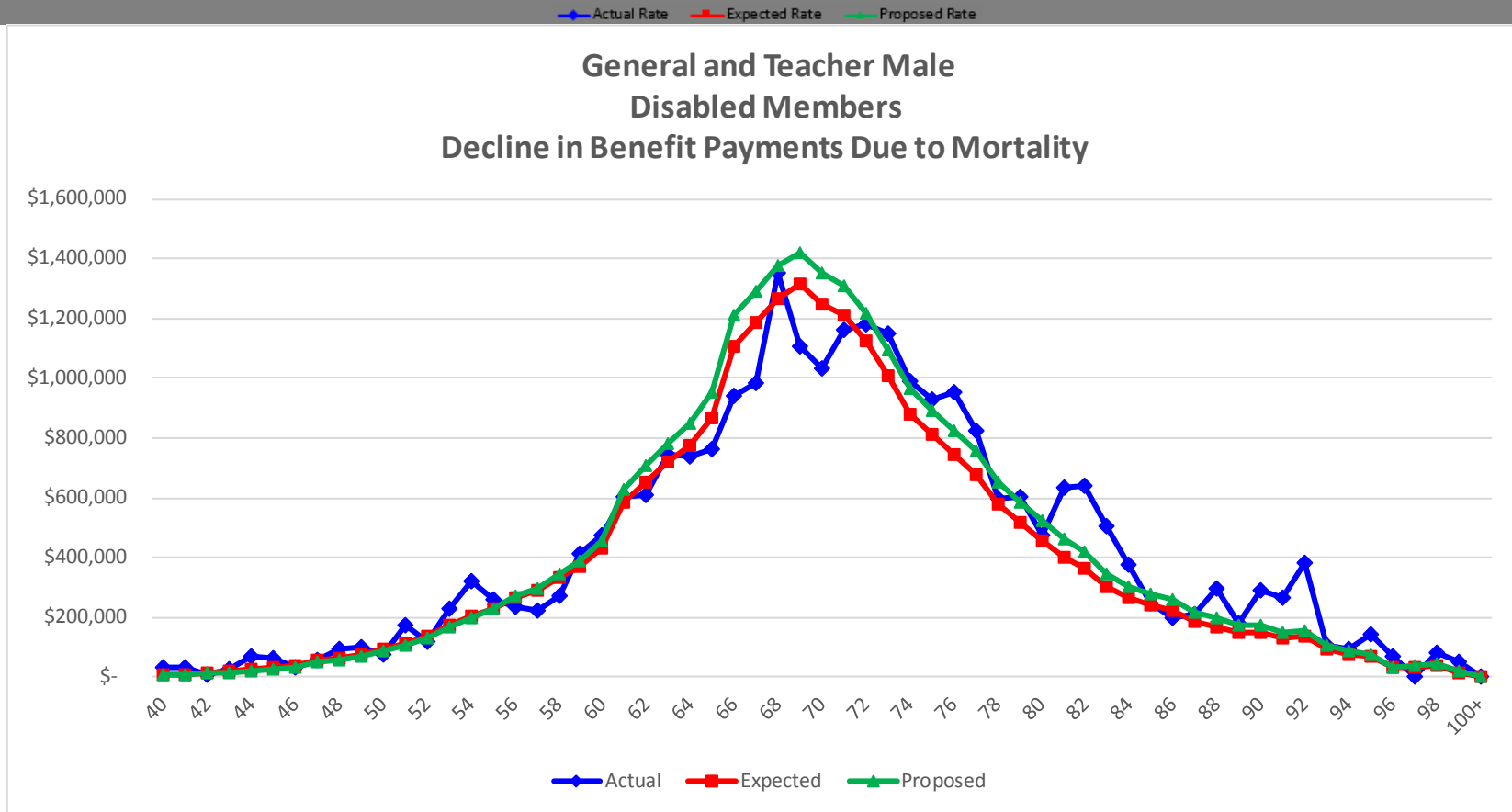


	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	30.71	31.66	0.9702	30.72	0.9999	
Total	30.71	31.66	0.9702	30.72	0.9999	Recommendation: adjust rates, generally down wards to reflect actual experience Impact: slight decrease

# Mortality

## Decline in Benefit Payments Due To Mortality

- Plan**
- TSERS:**
- Teachers
  - General Employees
  - Other Education
  - Law Enforcement
  - CJRS
  - LRS
  - National Guard
  - DIPNC
  - FRSWPF
- LGERS:**
- General Employees
  - Fire & Rescue
  - Law Enforcement
- RODs**
- Death
  - Membership
  - Active
  - Retiree
- Disabled**
- Beneficiary
  - Gender
- Males**
- Females
  - Males and Females

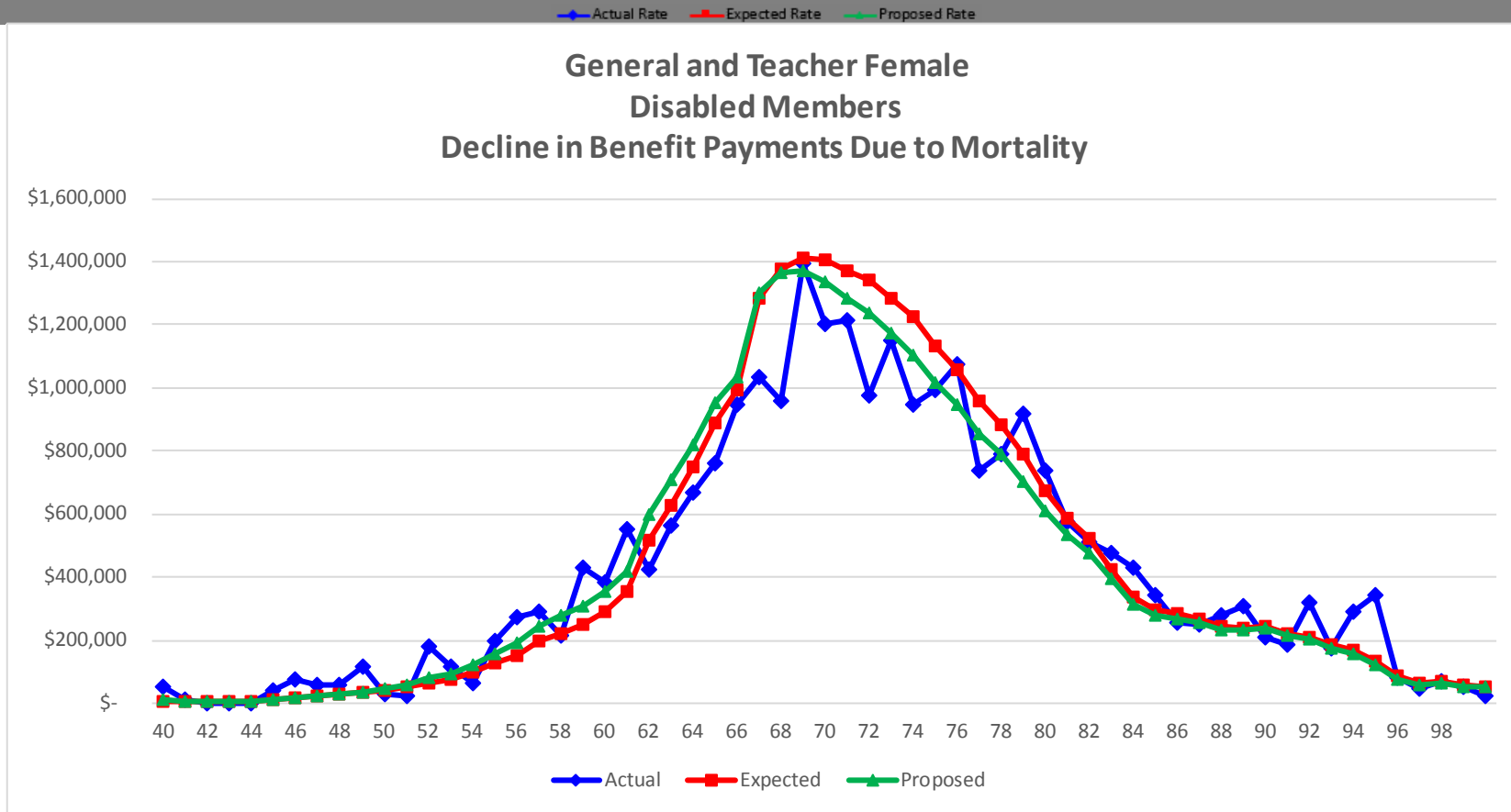


	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	25.81	23.84	1.0826	25.91	26.0785	
Total	25.81	23.84	1.0826	25.91	0.9961	Recommendation: adjust rates, generally up wards, to reflect actual experience
						Impact: minimal

# Mortality

## Decline in Benefit Payments Due To Mortality

- Plan**
- TSERS:
    - Teachers
    - General Employees
    - Other Education
    - Law Enforcement
    - CJRS
    - LRS
    - National Guard
    - DIPNC
    - FRSWPF
  - LGERS:
    - General Employees
    - Fire & Rescue
    - Law Enforcement
  - RODs**
    - Death
    - Membership
    - Active
    - Retiree
  - Disabled**
    - Beneficiary
    - Gender
    - Males
  - Females**
    - Males and Females

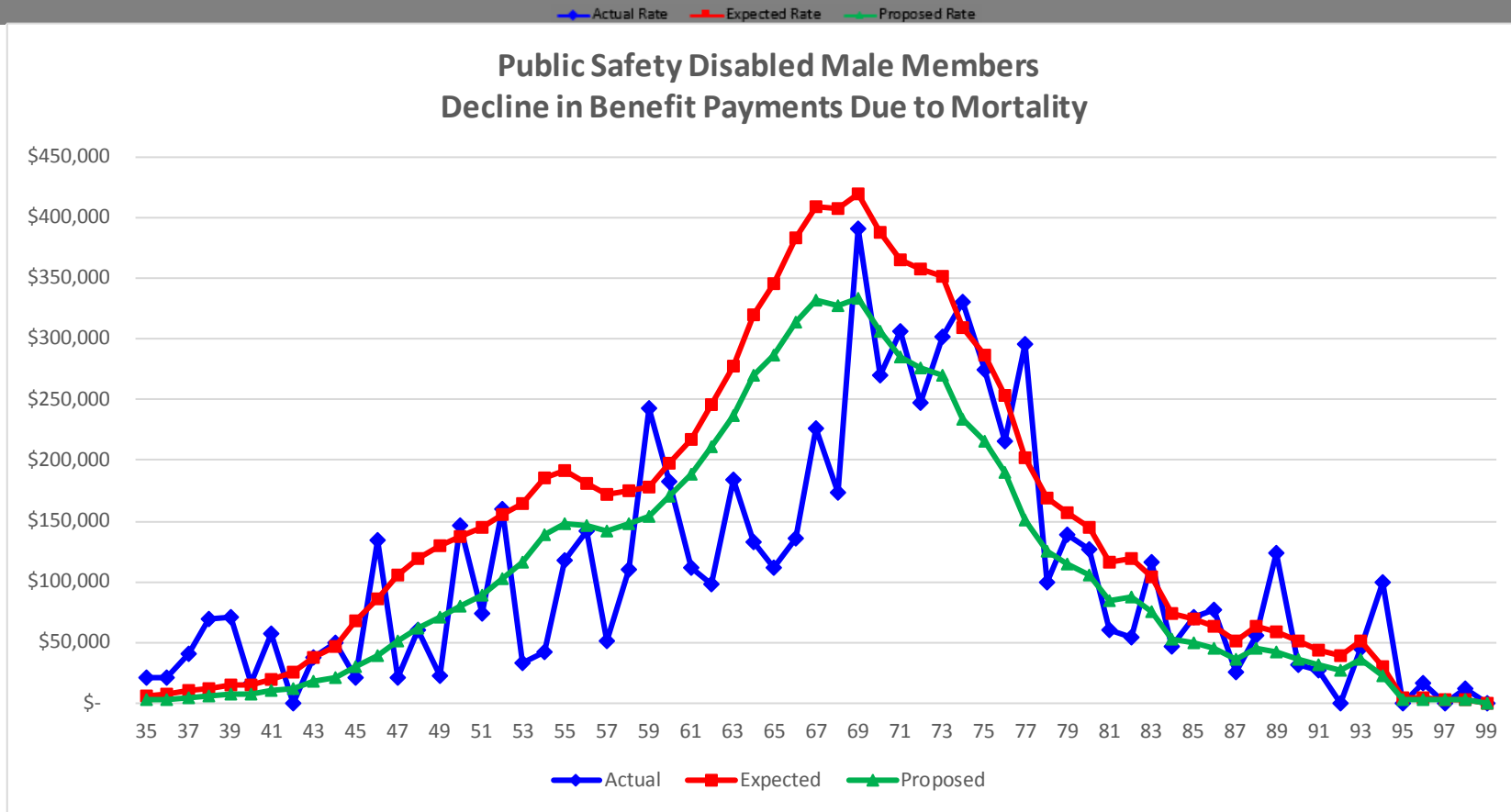


	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	26.08	26.87	0.9706	26.24	26.0785	
Total	26.08	26.87	0.9706	26.24	0.9938	Recommendation: adjust rates, generally down wards to reflect actual experience Impact: minimal

# Mortality

## Decline in Benefit Payments Due To Mortality

- Plan**
- TSERS:**
- Teachers
  - General Employees
  - Other Education
- Law Enforcement**
- CJRS
  - LRS
  - National Guard
  - DIPNC
- FRSWPF**
- LGERS:**
- General Employees
- Fire & Rescue**
- Law Enforcement**
- RODs
  - Death
  - Membership
  - Active
  - Retiree
- Disabled**
- Beneficiary
  - Gender
- Males**
- Females
  - Males and Females

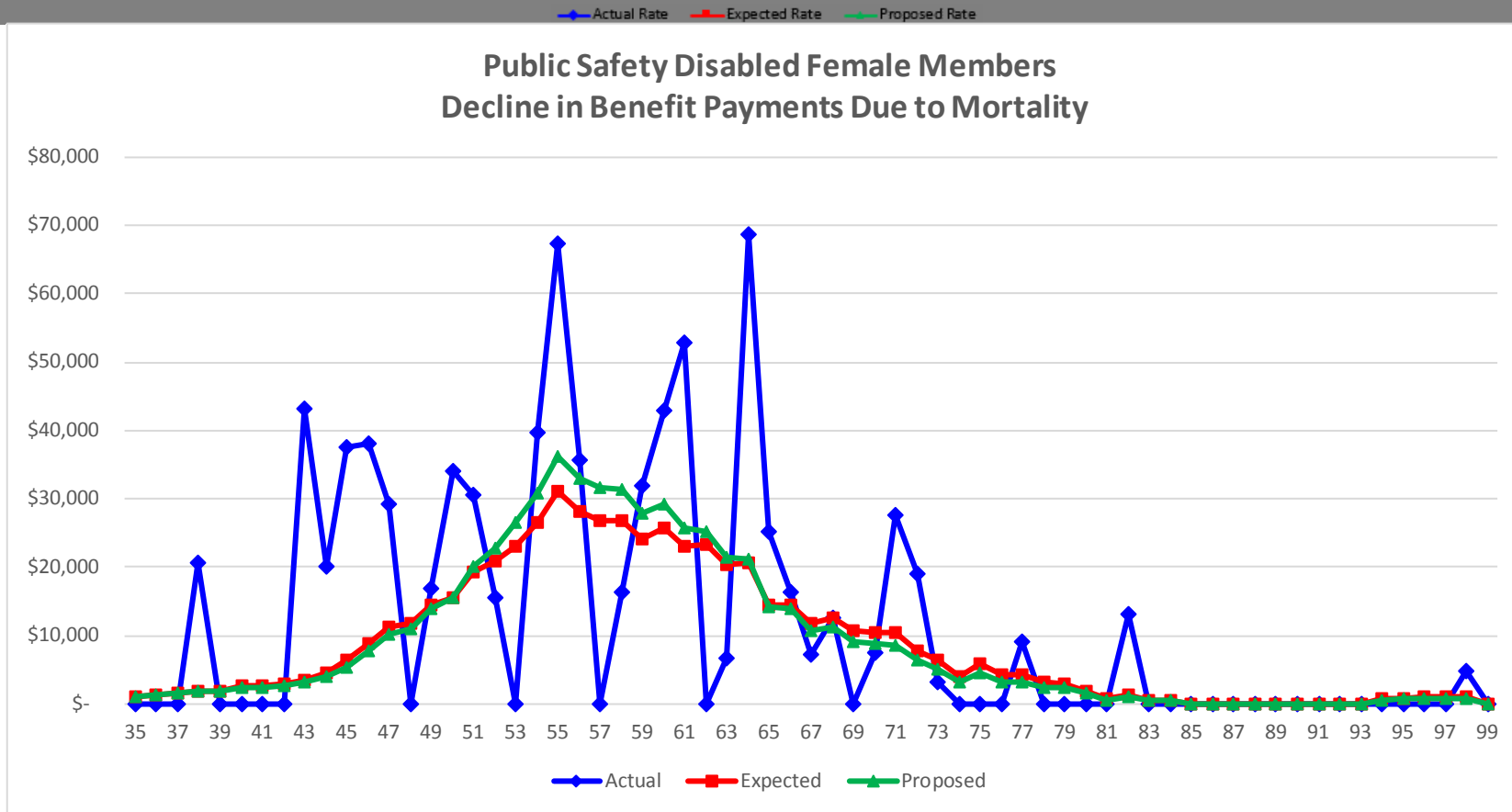


	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	7.03	9.56	0.7354	7.25	0.7937	
Total	7.03	9.56	0.7354	7.25	0.9696	Recommendation: adjust rates, generally down wards to reflect actual experience Impact: minimal

# Mortality

## Decline in Benefit Payments Due To Mortality

- Plan**
- TSERS:**
- Teachers
  - General Employees
  - Other Education
- Law Enforcement**
- CJRS
  - LRS
  - National Guard
  - DIPNC
- FRSWPF**
- LGERS:**
- General Employees
- Fire & Rescue**
- Law Enforcement**
- RODs
  - Death
  - Membership
  - Active
  - Retiree
- Disabled**
- Beneficiary
  - Gender
  - Males
- Females**
- Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	0.79	0.57	1.3917	0.59	0.7937	
Total	0.79	0.57	1.3917	0.59	1.3498	
						Recommendation: adjust rates, generally upwards, to reflect actual experience
						Impact: minimal

# Mortality

## Decline in Benefit Payments Due To Mortality

### Plan

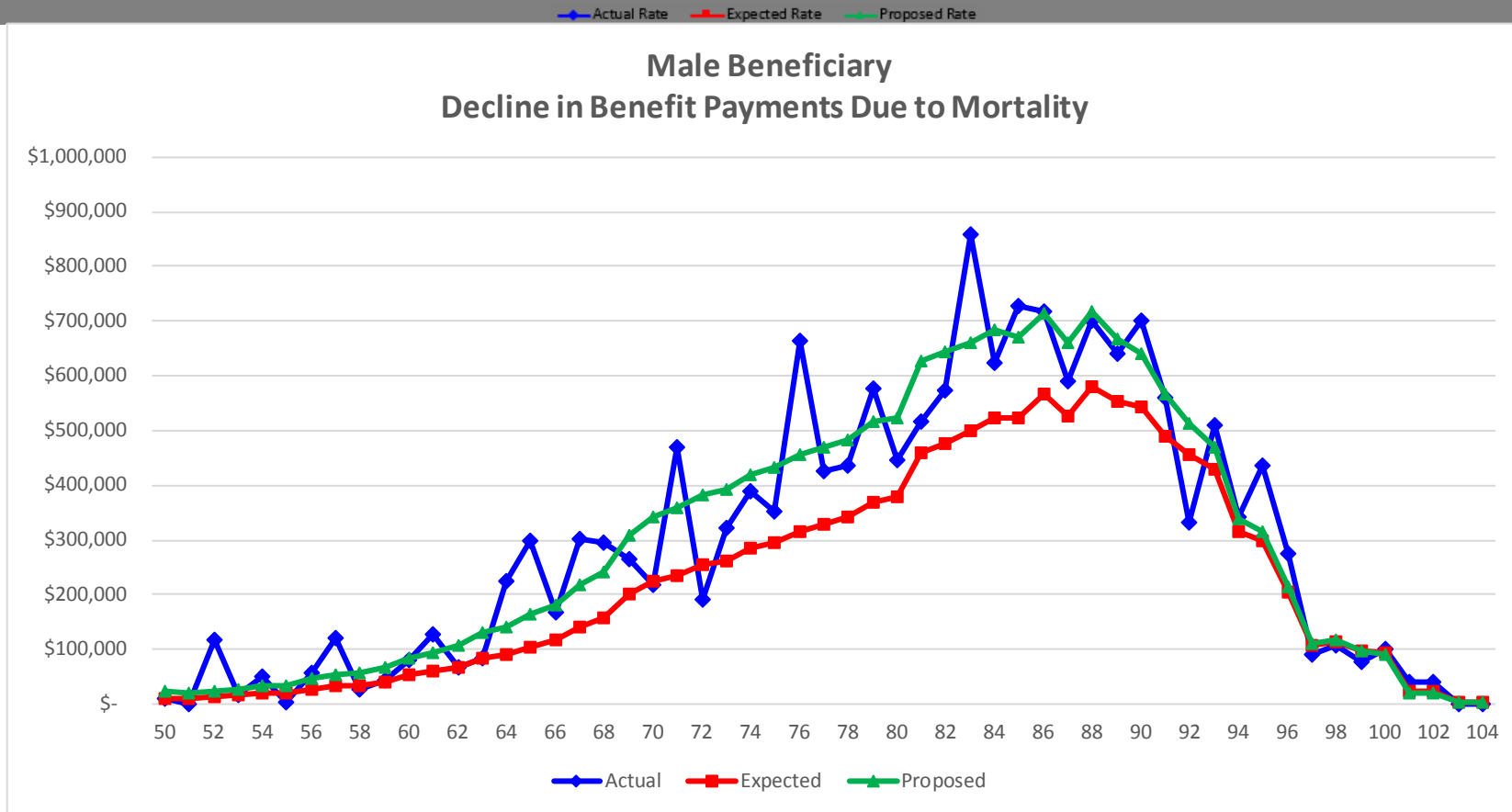
TSERS:  
-Teachers  
-General Employees  
-Other Education  
-Law Enforcement  
CJRS  
LRS  
National Guard  
DIPNC  
FRSWPF  
LGERS:  
-General Employees  
-Fire & Rescue  
-Law Enforcement  
RODs  
Death  
Membership  
Active  
Retiree  
Disabled

### Beneficiary

Gender

### Males

Females  
Males and Females

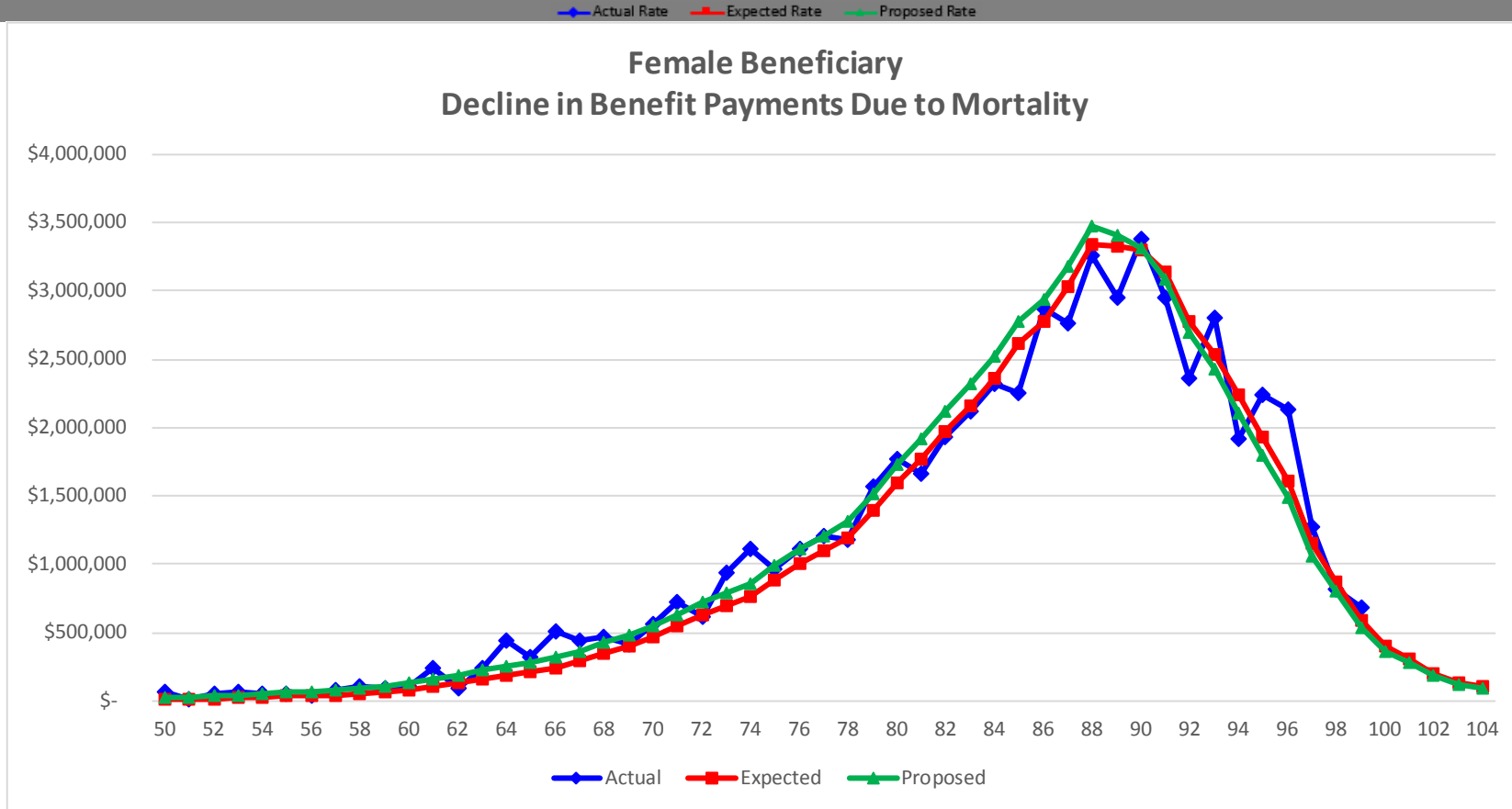


	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	16.44	12.47	1.3185	16.46	0.9987	
Total	16.44	12.47	1.3185	16.46	0.9987	Recommendation: adjust rates, generally up wards, to reflect actual experience Impact: minimal

# Mortality

## Decline in Benefit Payments Due To Mortality

- Plan**
- TSERS:
  - Teachers
  - General Employees
  - Other Education
  - Law Enforcement
  - CJRS
  - LRS
  - National Guard
  - DIPNC
  - FRSWPF
  - LGERS:
  - General Employees
  - Fire & Rescue
  - Law Enforcement
  - RODs
  - Death
  - Membership
  - Active
  - Retiree
  - Disabled
- Beneficiary**
- Gender
  - Males
- Females**
- Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more decline in benefit payments due to mortality over the period than expected overall
Reduction in benefits \$M	59.12	56.80	1.0408	59.36	0.9959	
Total	59.12	56.80	1.0408	59.36	0.9959	Recommendation: adjust rates, generally upwards, to reflect actual experience
						Impact: minimal

# Retirement

- Retirement rates vary by age, gender, employee group and type of retirement (i.e., reduced and unreduced)
- The current retirement rates are based on the recommendation made in the prior experience study
- Use of actual experience of the plans is common practice
- The current retirement rates resulted in expected retirements greater than actual retirements for all employee groups other than National Guard and Law Enforcement Officers; proposed rates were adjusted to reflect this experience
- Generally, assuming more (fewer) retirements results in higher (lower) estimated costs

# Retirement

**Plan**

**TSERS:**

**-Teachers**

-General Employees

-Other Education

-Law Enforcement

CJRS

LRS

National Guard

DIPNC

FRSWPF

LGERS:

-General Employees

-Fire & Rescue

-Law Enforcement

RODs

Death

Membership

**Active**

Retiree

Disabled

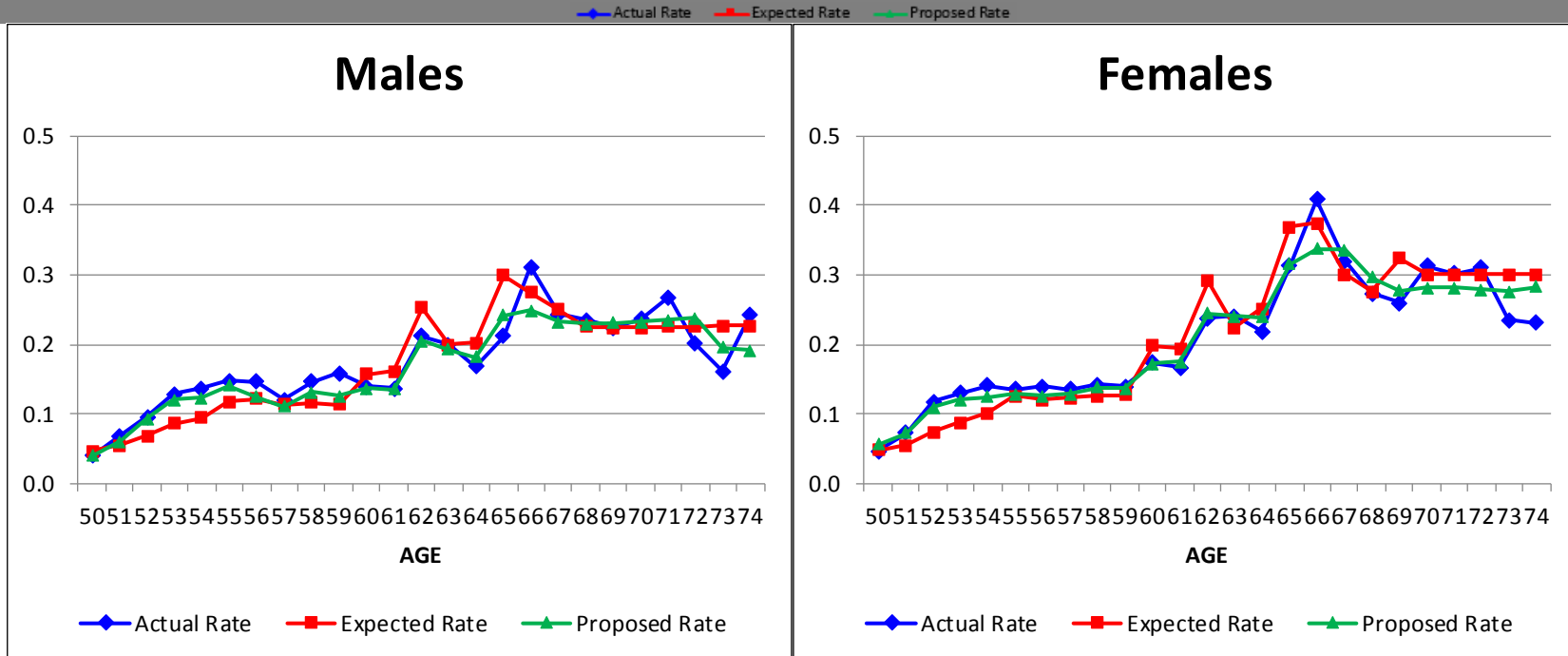
Beneficiary

Gender

**Males**

**Females**

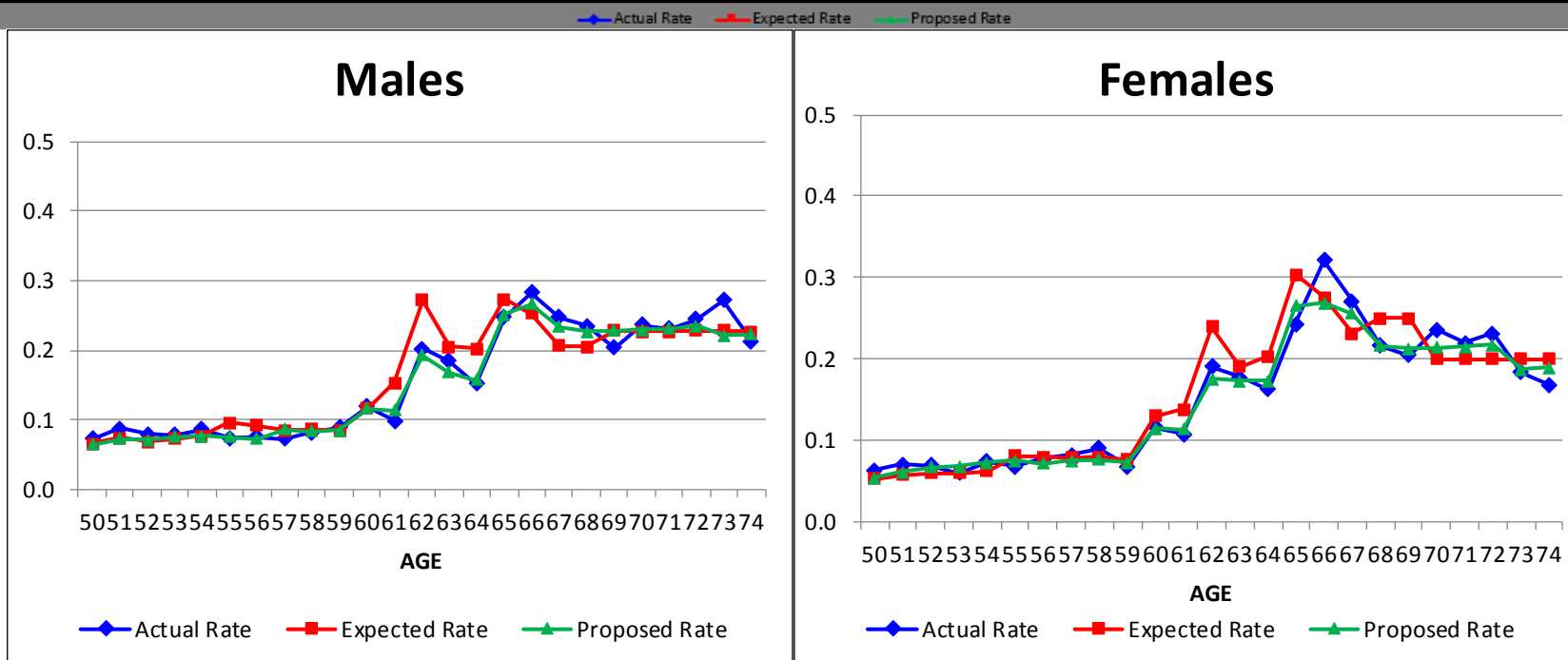
Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er retirements over the period than expected overall
Males	4,112.00	4,392.88	0.9361	4,202.17	0.9785	Recommendation: adjust rates, generally down wards to reflect actual experience Impact: slight decrease
Females	16,948.00	17,311.73	0.9790	16,986.32	0.9977	
Total	21,060	21,704.61	0.9703	21,188.49	0.9939	

# Retirement

- Plan**
- TSERS:**
- Teachers
- General Employees**
- Other Education
  - Law Enforcement
  - CJRS
  - LRS
  - National Guard
  - DIPNC
  - FRSWPF
  - LGERS:
  - General Employees
  - Fire & Rescue
  - Law Enforcement
  - RODs
  - Death
  - Membership
- Active**
- Retiree
  - Disabled
  - Beneficiary
  - Gender
- Males**
- Females**
- Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er retirements over the period than expected overall
Males	6,611.00	7,585.02	0.8716	6,828.53	0.9681	
Females	7,990.00	9,012.03	0.8866	8,118.88	0.9841	
Total	14,601	16,597.05	0.8797	14,947.41	0.9768	Recommendation: adjust rates, generally down wards to reflect actual experience
						Impact: slight decrease

# Retirement

**Plan**

**TSERS:**

- Teachers
- General Employees

**-Other Education**

- Law Enforcement

CJRS

LRS

National Guard

DIPNC

FRSWPF

LGERS:

- General Employees
- Fire & Rescue
- Law Enforcement

RODs

Death

Membership

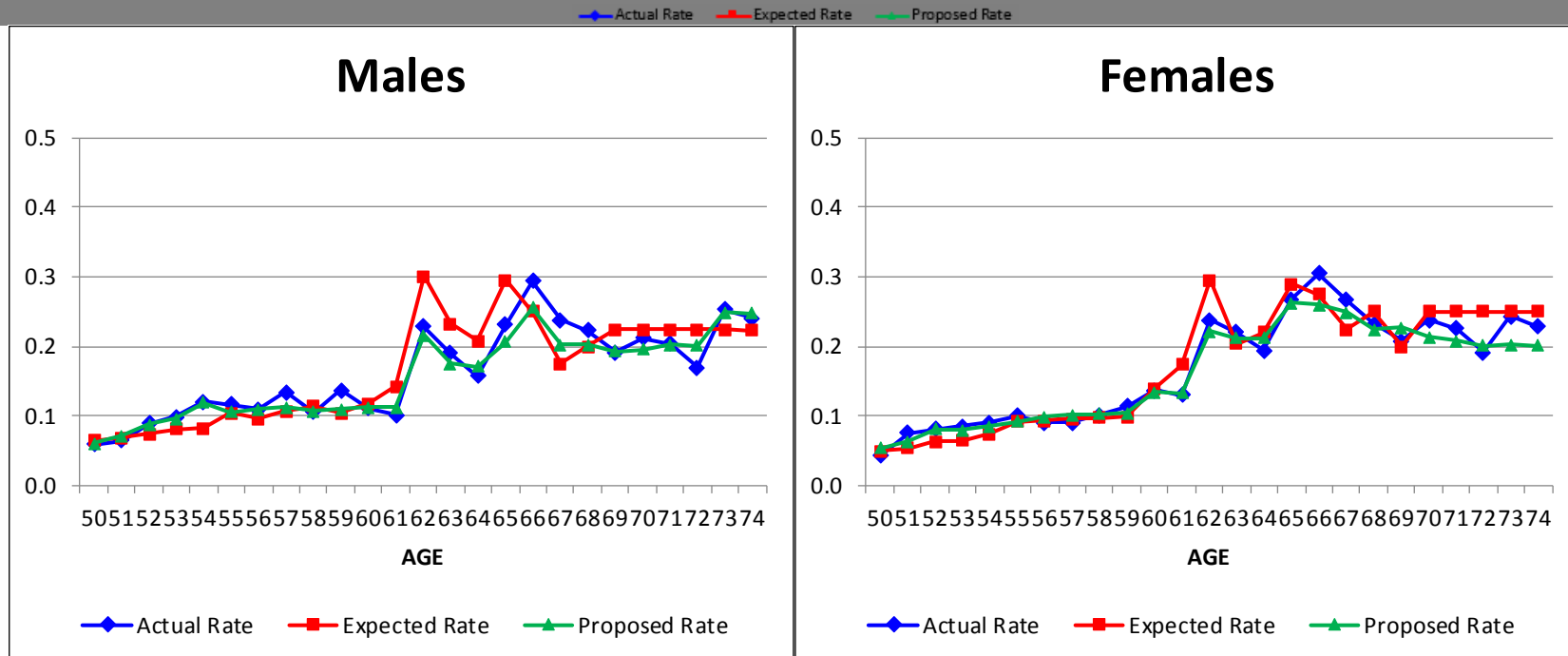
**Active**

- Retiree
- Disabled
- Beneficiary
- Gender

**Males**

**Females**

Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er retirements over the period than expected overall
Males	2,900.00	3,463.93	0.8372	3,116.94	0.9304	
Females	6,505.00	7,087.38	0.9178	6,631.55	0.9809	
Total	9,405	10,551.31	0.8914	9,748.49	0.9648	Recommendation: adjust rates, generally down wards to reflect actual experience
						Impact: slight decrease

# Retirement

- Plan**
- TSERS:**
- Teachers
  - General Employees
  - Other Education
- Law Enforcement**
- CJRS
  - LRS
  - National Guard
  - DIPNC
  - FRSWPF
  - LGERS:
  - General Employees
  - Fire & Rescue
  - Law Enforcement
- RODs
- Death
- Membership
- Active**
- Retiree
  - Disabled
  - Beneficiary
  - Gender
- Males**
- Females**
- Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more retirements over the period than expected overall
Males	754.00	697.88	1.0804	742.05	1.0161	Recommendation: adjust rates, generally up wards, to reflect actual experience Impact: slight increase
Total	754.00	697.88	1.0804	742.05	1.0161	

# Mortality

## Decline in Benefit Payments Due To Mortality

**Plan**

**TSERS:**

- Teachers
- General Employees
- Other Education
- Law Enforcement

**CJRS**

- LRS
- National Guard
- DIPNC
- FRSWPF
- LGERS:
- General Employees
- Fire & Rescue
- Law Enforcement

**RODs**

- Death
- Membership

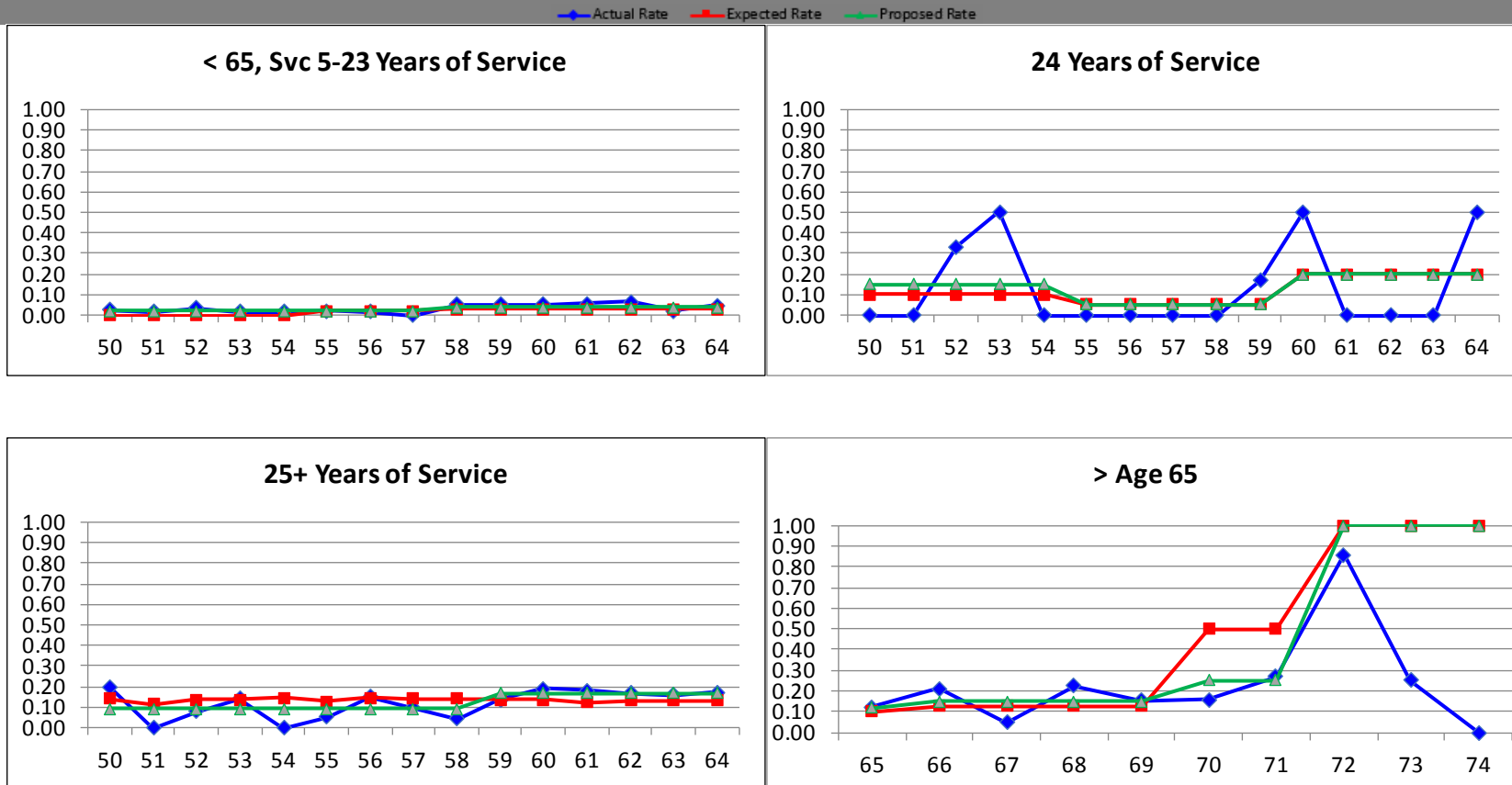
**Active**

- Retiree
- Disabled
- Beneficiary
- Gender

**Males**

**Females**

Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er decline in benefit payments due to mortality over the period than expected overall other than the follow ing groups: 5 - 23 years of Service, 24 Years of Service
5 - 23 years of Service	28.00	14.67	1.9087	25.42	1.1015	
24 Years of Service	7.00	6.60	1.0606	7.30	0.9589	
25+ Years of Service	36	40.24	0.8946	37.75	0.9536	Recommendation: adjust rates, generally down wards to reflect actual experience
> Age 65	92	118.17	0.7785	105.60	0.8712	
Total	163	179.68	0.9072	176.07	0.9258	Impact: slight increase

# Retirement

**Plan**

**TSERS:**

- Teachers
- General Employees
- Other Education
- Law Enforcement
- CJRS

**LRS**

- National Guard
- DIPNC
- FRSWPF
- LGERS:
- General Employees
- Fire & Rescue
- Law Enforcement
- RODs
- Death
- Membership

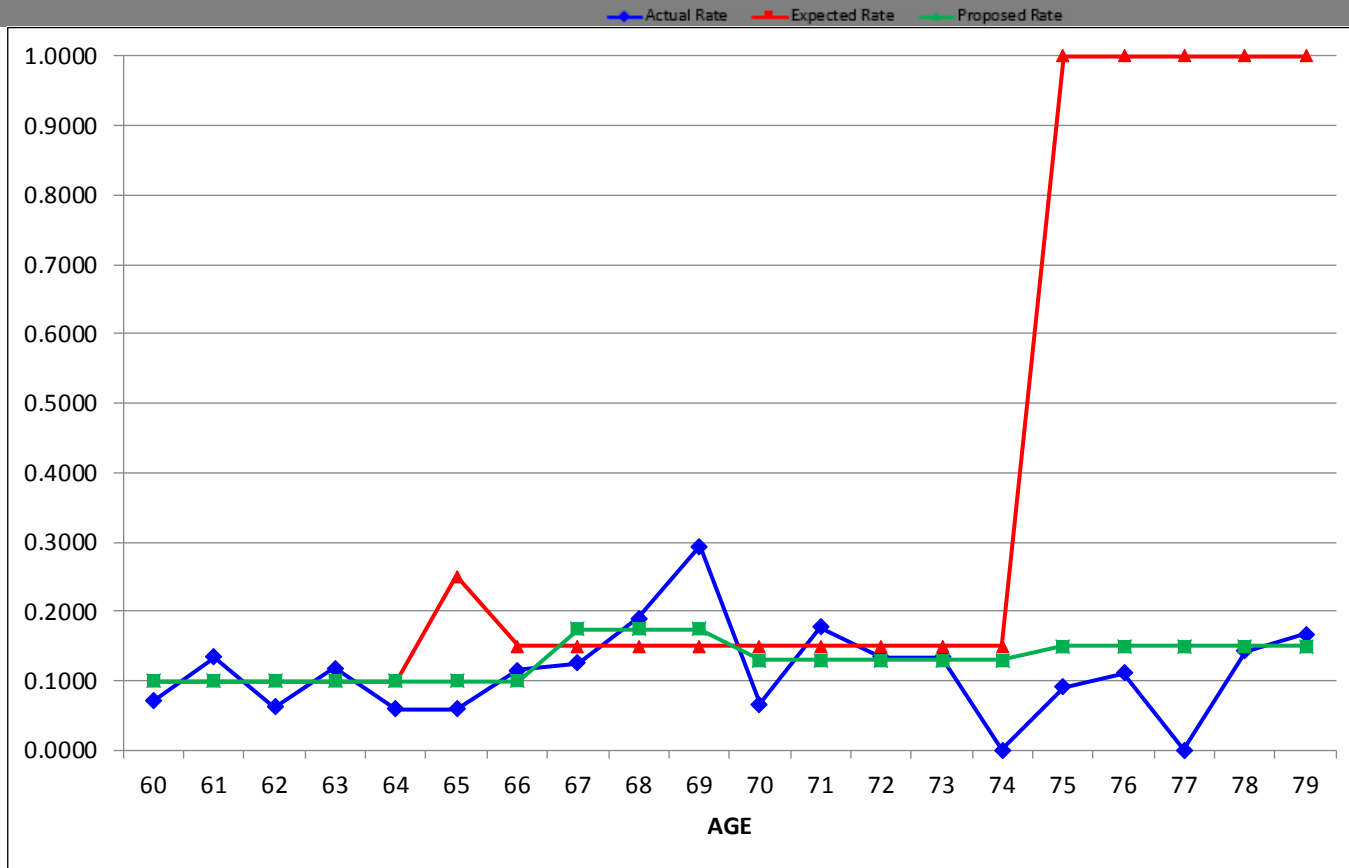
**Active**

- Retiree
- Disabled
- Beneficiary
- Gender

**Males**

**Females**

Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er retirements over the period than expected overall
Males	39.00	89.45	0.4360	51.67	0.7548	Recommendation: adjust rates, generally down wards to reflect actual experience Impact: slight decrease
Total	39.00	89.45	0.4360	51.67	0.7548	

# Retirement

**Plan**

**TSERS:**

- Teachers
- General Employees
- Other Education
- Law Enforcement
- CJRS
- LRS

**National Guard**

- DIPNC
- FRSWPF

**LGERS:**

- General Employees
- Fire & Rescue
- Law Enforcement

**RODs**

- Death
- Membership

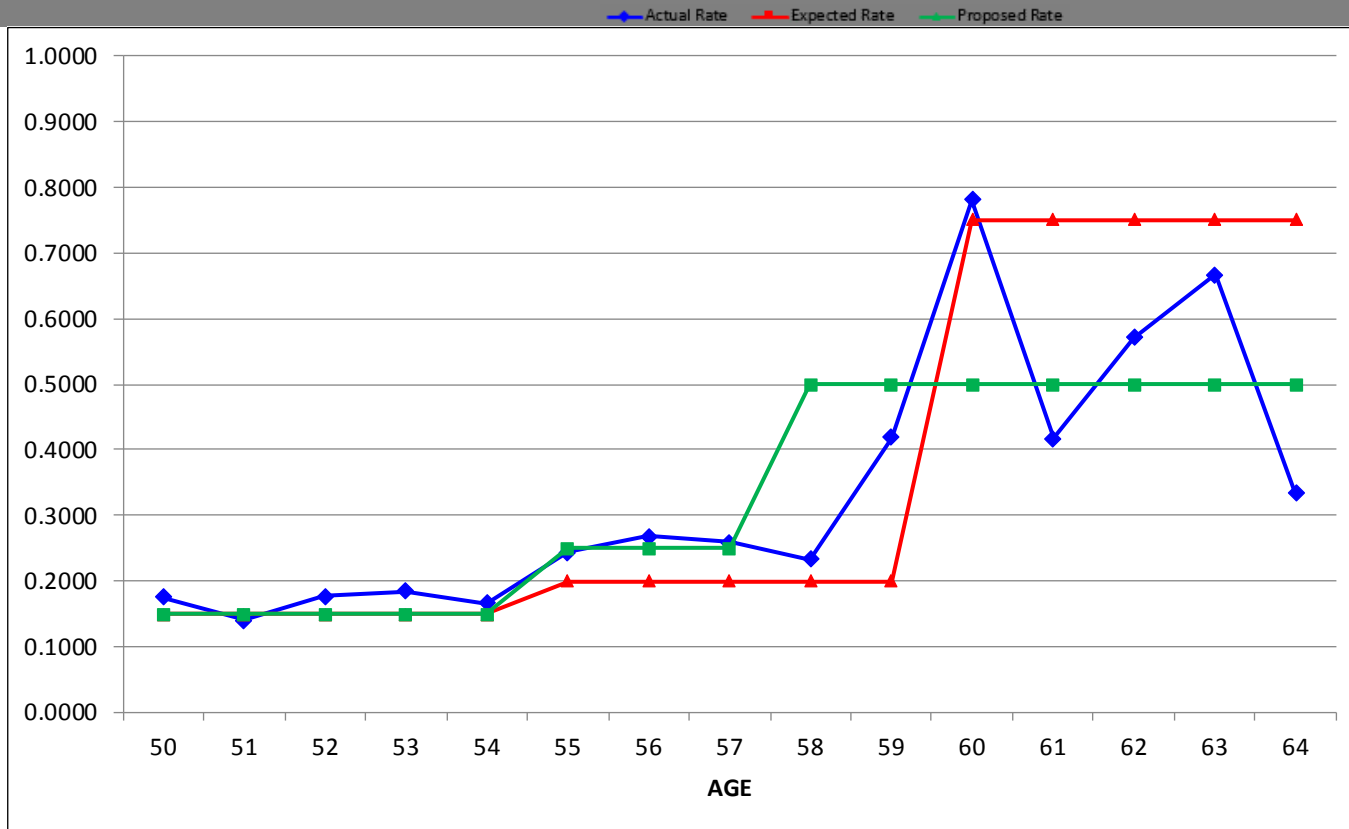
**Active**

- Retiree
- Disabled
- Beneficiary
- Gender

**Males**

**Females**

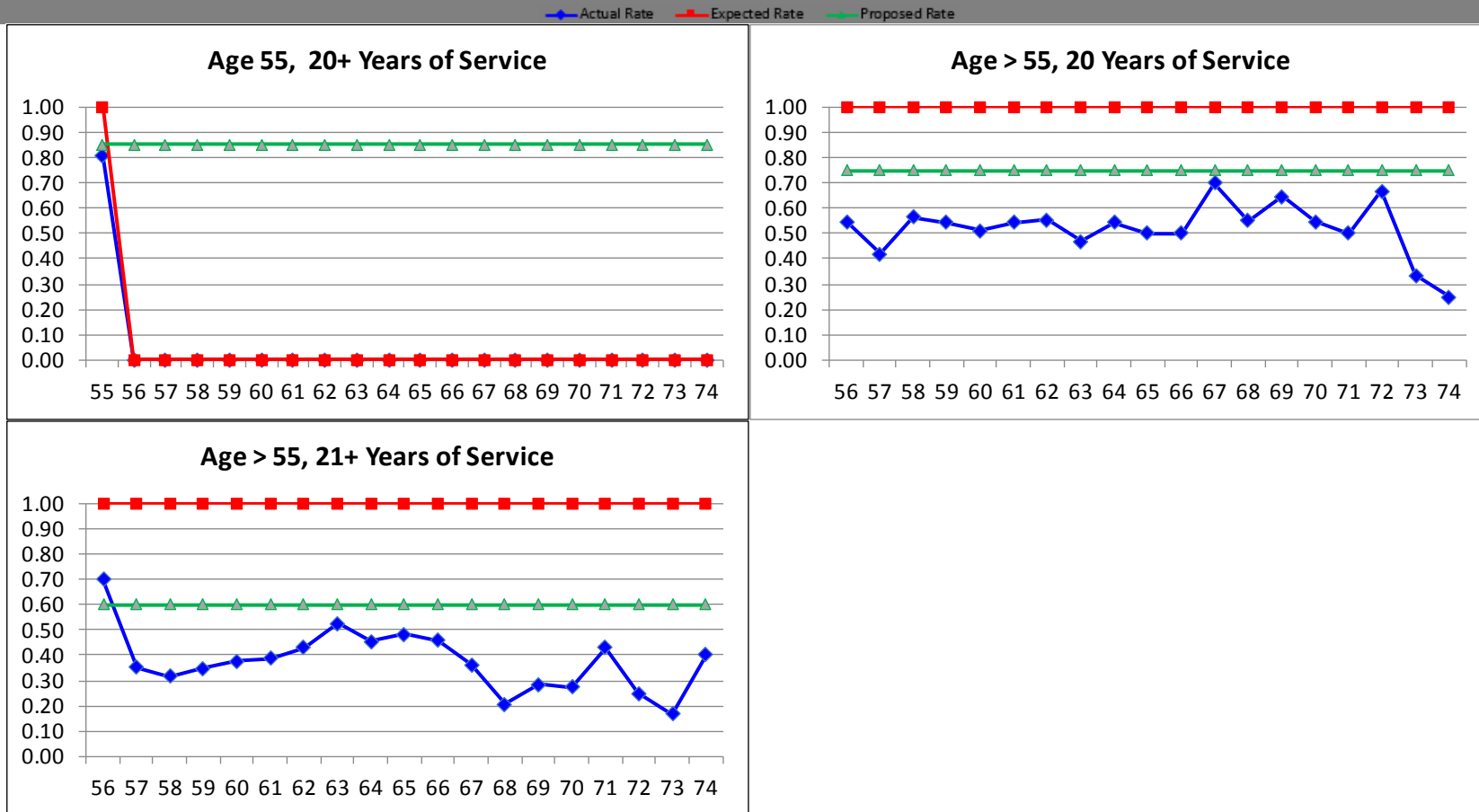
Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more retirements over the period than expected overall
Males	327.00	290.60	1.1253	324.40	1.0080	Recommendation: adjust rates, generally upw ards, to reflect actual experience Impact: slight increase
Total	327.00	290.60	1.1253	324.40	1.0080	

# Retirement

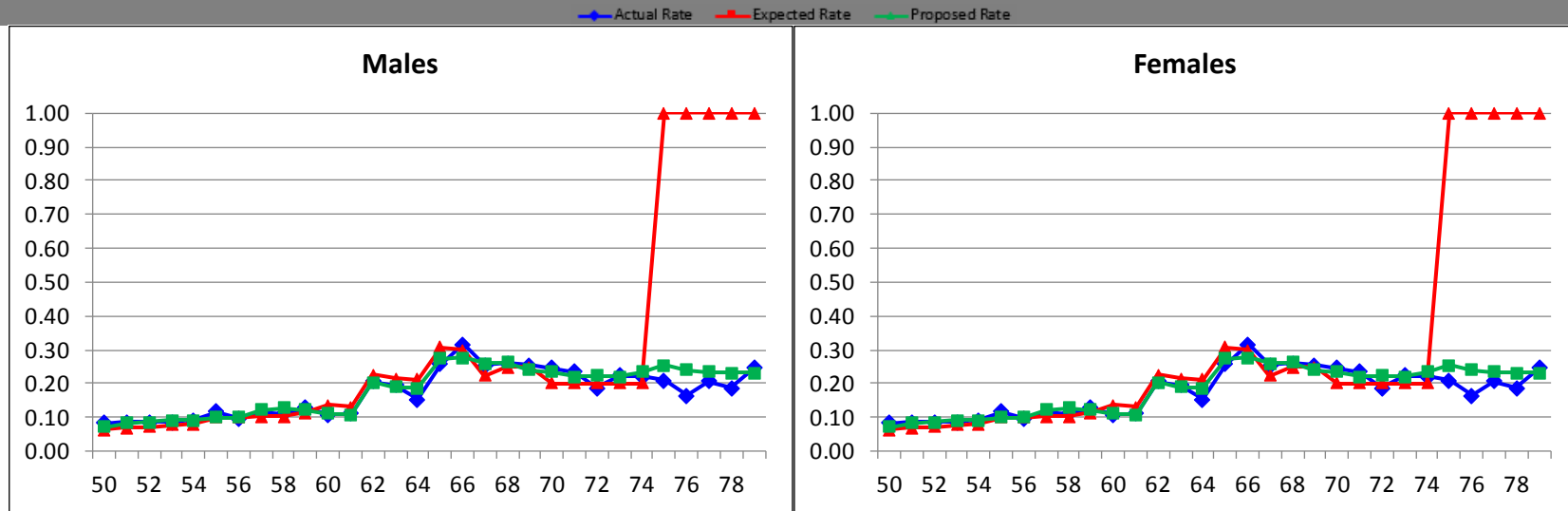
- Plan**
- TSERS:
  - Teachers
  - General Employees
  - Other Education
  - Law Enforcement
  - CJRS
  - LRS
  - National Guard
  - DIPNC
  - FRSWPF**
  - LGERS:
  - General Employees
  - Fire & Rescue
  - Law Enforcement
  - RODs
  - Death
  - Membership
  - Active**
  - Retiree
  - Disabled
  - Beneficiary
  - Gender
  - Males**
  - Females**
  - Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er retirements over the period than expected overall other than the follow ing groups: Age 55, 20+ Yrs of SVC, > 55, 20 yrs of Service
Age 55, 20+ Yrs of SVC	-	28.00	14.6700	1.91	25.4200	
> 55, 20 yrs of Service	7.00	6.60	1.0606	7.30	0.9589	
> 55, 21+ Yrs of Service	36	40.24	0.8946	37.75	0.9536	Recommendation: adjust rates, generally down wards to reflect actual experience
Total	43	74.84	0.5746	46.96	0.9157	Impact: slight decrease

# Retirement

- Plan**
- TSERS:
  - Teachers
  - General Employees
  - Other Education
  - Law Enforcement
  - CJRS
  - LRS
  - National Guard
  - DIPNC
  - FRSWPF
- LGERS:**
- General Employees
  - Fire & Rescue
  - Law Enforcement
- RODs**
- Death
  - Membership
- Active**
- Retiree
  - Disabled
  - Beneficiary
  - Gender
- Males**
- Females**
- Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er retirements over the period than expected overall
Males	6,359.00	7,191.42	0.8842	6,545.59	0.9715	
Females	7,698.00	8,828.28	0.8720	7,844.64	0.9813	
Total	14,057	16,019.70	0.8775	14,390.23	0.9768	Recommendation: adjust rates, generally down wards to reflect actual experience
						Impact: slight decrease

# Retirement

## Plan

TSERS:  
-Teachers  
-General Employees  
-Other Education  
-Law Enforcement  
CJRS  
LRS  
National Guard  
DIPNC  
FRSWPF

## LGERS:

-General Employees

## -Fire & Rescue

-Law Enforcement

RODs

Death

Membership

## Active

Retiree

Disabled

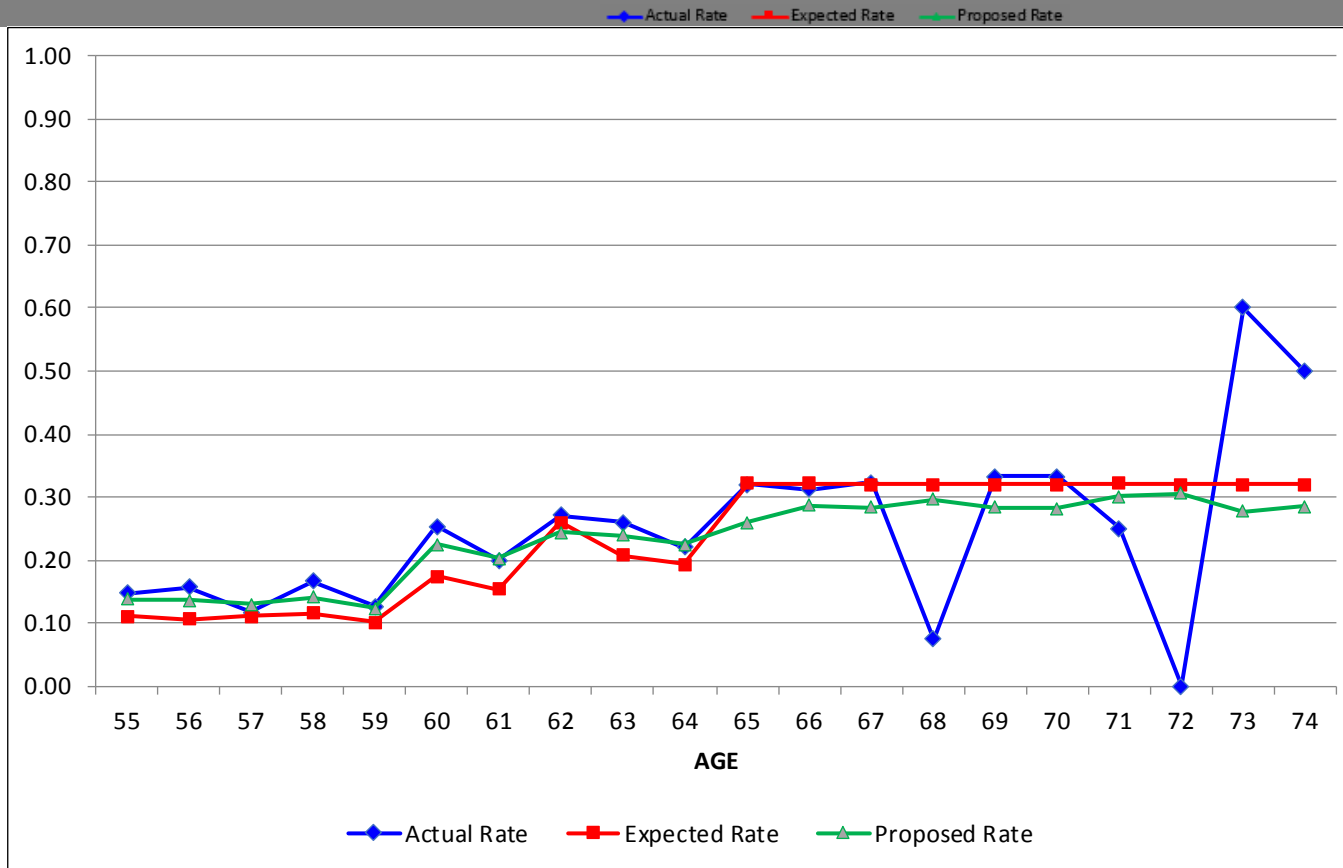
Beneficiary

Gender

Males

Females

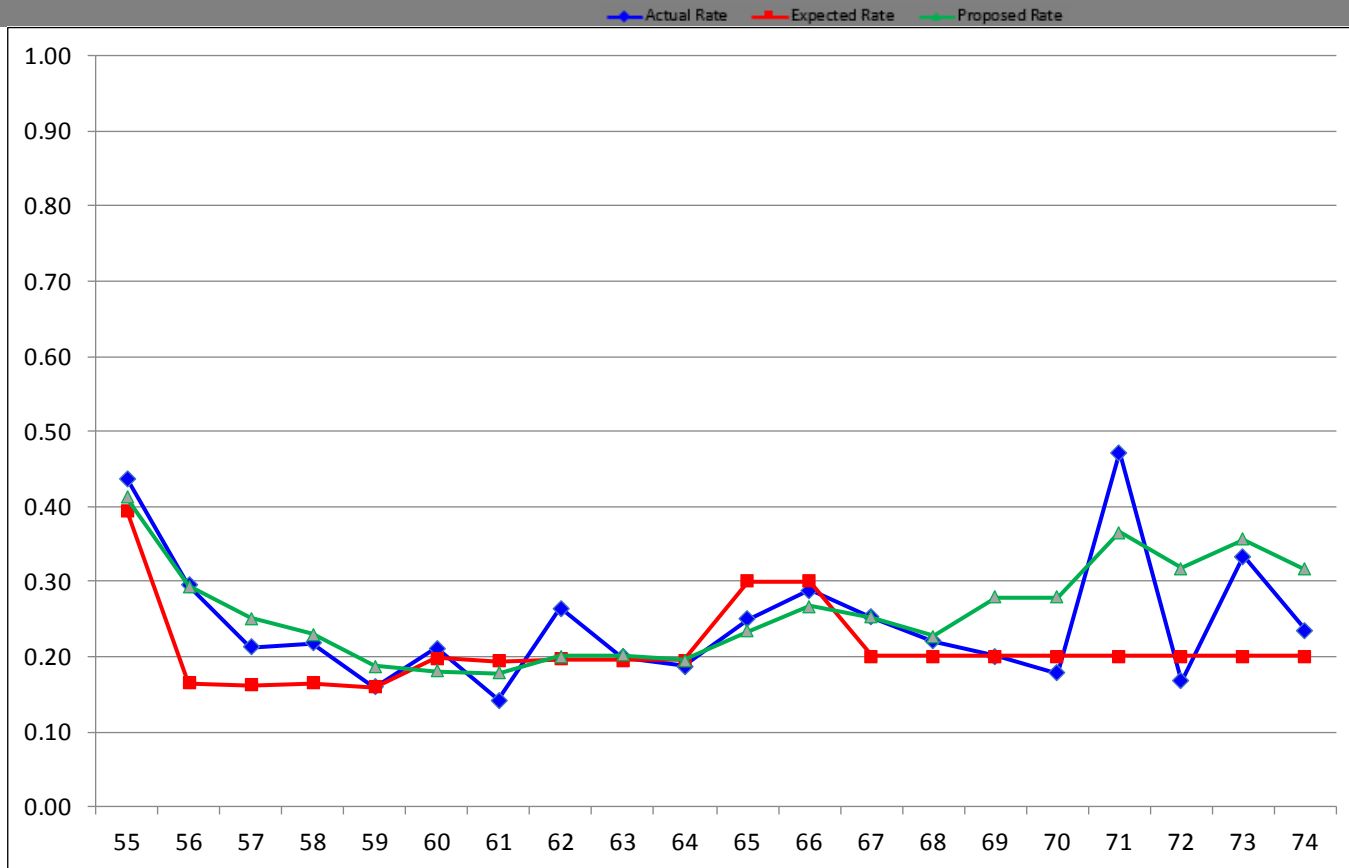
## Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more retirements over the period than expected overall
Total	1,116.00	876.89	1.2727	1,040.72	1.0723	
Total	1,116.00	876.89	1.2727	1,040.72	1.0723	Recommendation: adjust rates, generally upw ards, to reflect actual experience
						Impact: slight increase

# Retirement

- Plan**
- TSERS:
- Teachers
- General Employees
- Other Education
- Law Enforcement
- CJRS
- LRS
- National Guard
- DIPNC
- FRSWPF
- LGERS:**
- General Employees
- Fire & Rescue
- Law Enforcement**
- RODs
- Death
- Membership
- Active**
- Retiree
- Disabled
- Beneficiary
- Gender
- Males
- Females
- Males and Females**



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more retirements over the period than expected overall
Total	2,874.00	2,665.77	1.0781	2,806.94	1.0239	
Total	2,874.00	2,665.77	1.0781	2,806.94	1.0239	Recommendation: adjust rates, generally upwards, to reflect actual experience
						Impact: increase

# Termination

- The valuation anticipates that members may leave active service for reasons other than retirement, disability and death. We refer to these other reasons as termination
- Rates of termination can vary significantly from plan to plan, employee group and by gender, so use of actual experience of the plan is common practice
- Rates of termination tend to be higher earlier in a member's career, so two sets of rates are developed:
  - A set of rates for the first five years of a member's career. These rates are higher than those assumed in the rest of the career and vary based on the member's service
  - A set of rates for the rest of a member's career that vary based on the member's age
- The current termination rates resulted in expected terminations greater than actual terminations for all employee groups other than Fire and Rescue; proposed rates were adjusted to reflect this experience; for CJRS we recommend rates for the first time
- Generally, assuming more (fewer) terminations results in higher (lower) estimated costs

# Termination (<5 Years of Service)

**Plan**

**TSERS:**

**-Teachers**

-General Employees

-Other Education

-Law Enforcement

CJRS

LRS

National Guard

DIPNC

FRSWPF

LGERS:

-General Employees

-Fire & Rescue

-Law Enforcement

RODs

Death

Membership

**Active**

Retiree

Disabled

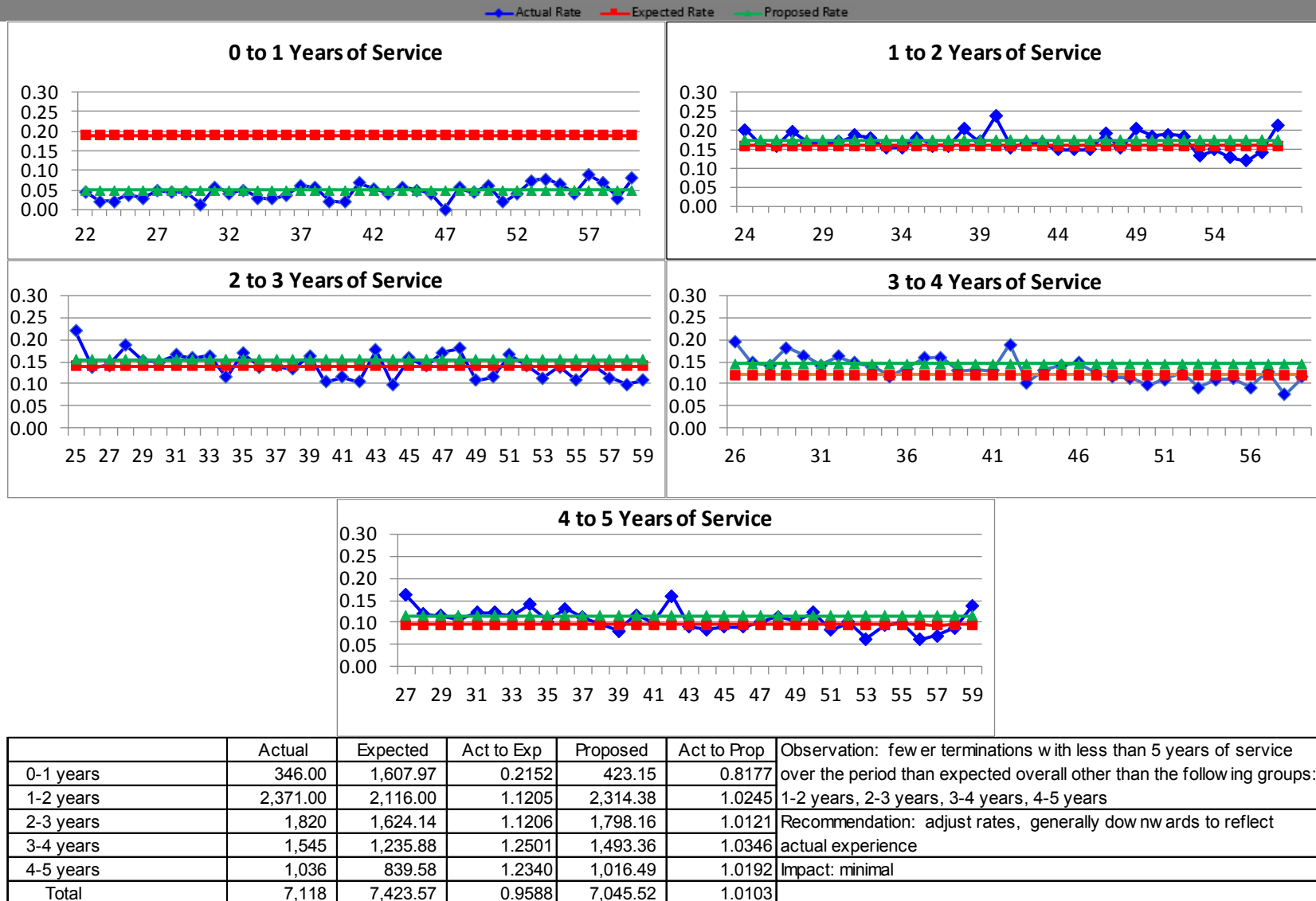
Beneficiary

Gender

**Males**

Females

Males and Females



# Termination (<5 Years of Service)

**Plan**

**TSERS:**

**-Teachers**

-General Employees

-Other Education

-Law Enforcement

CJRS

LRS

National Guard

DIPNC

FRSWPF

LGERS:

-General Employees

-Fire & Rescue

-Law Enforcement

RODs

Death

Membership

**Active**

Retiree

Disabled

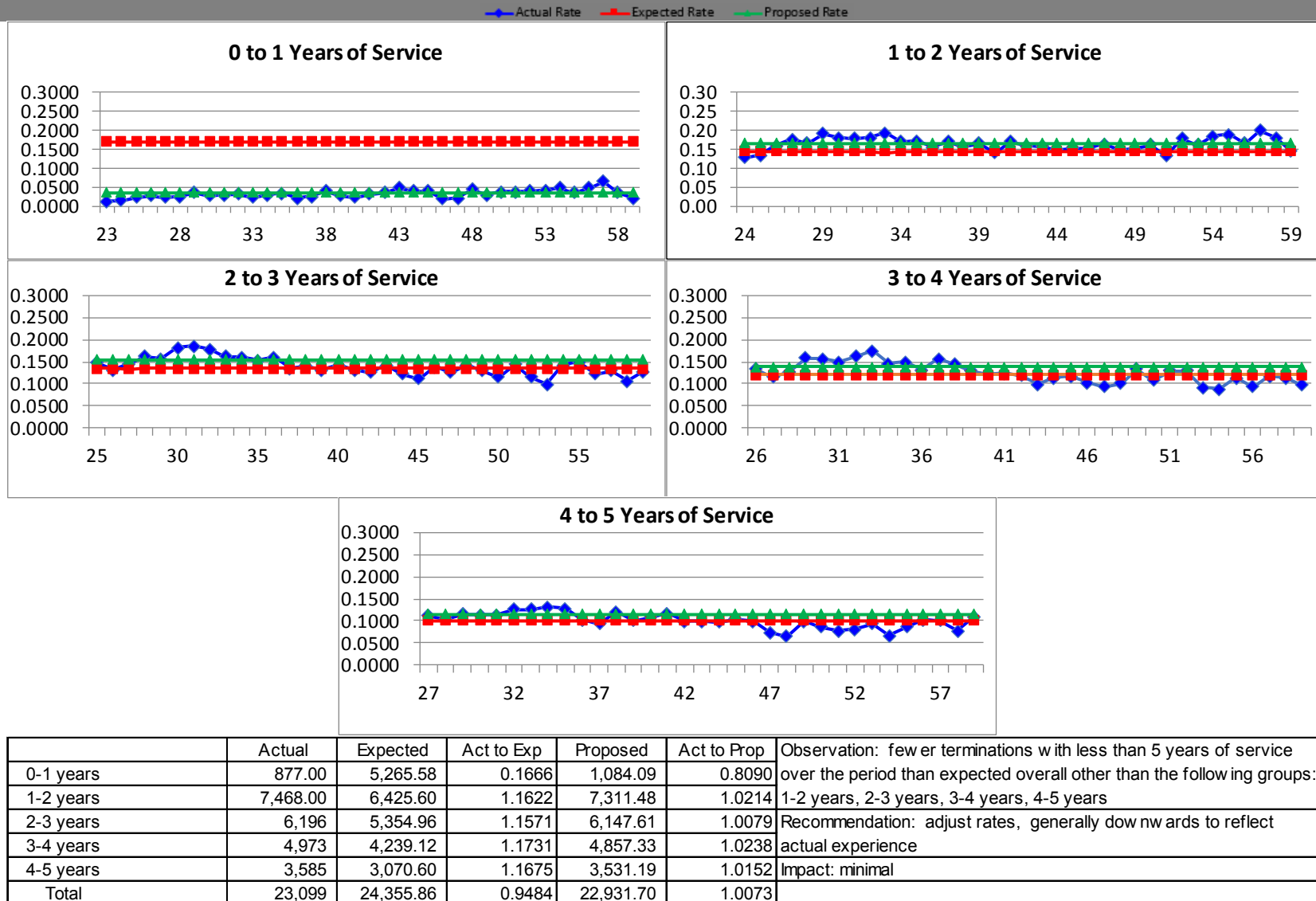
Beneficiary

Gender

Males

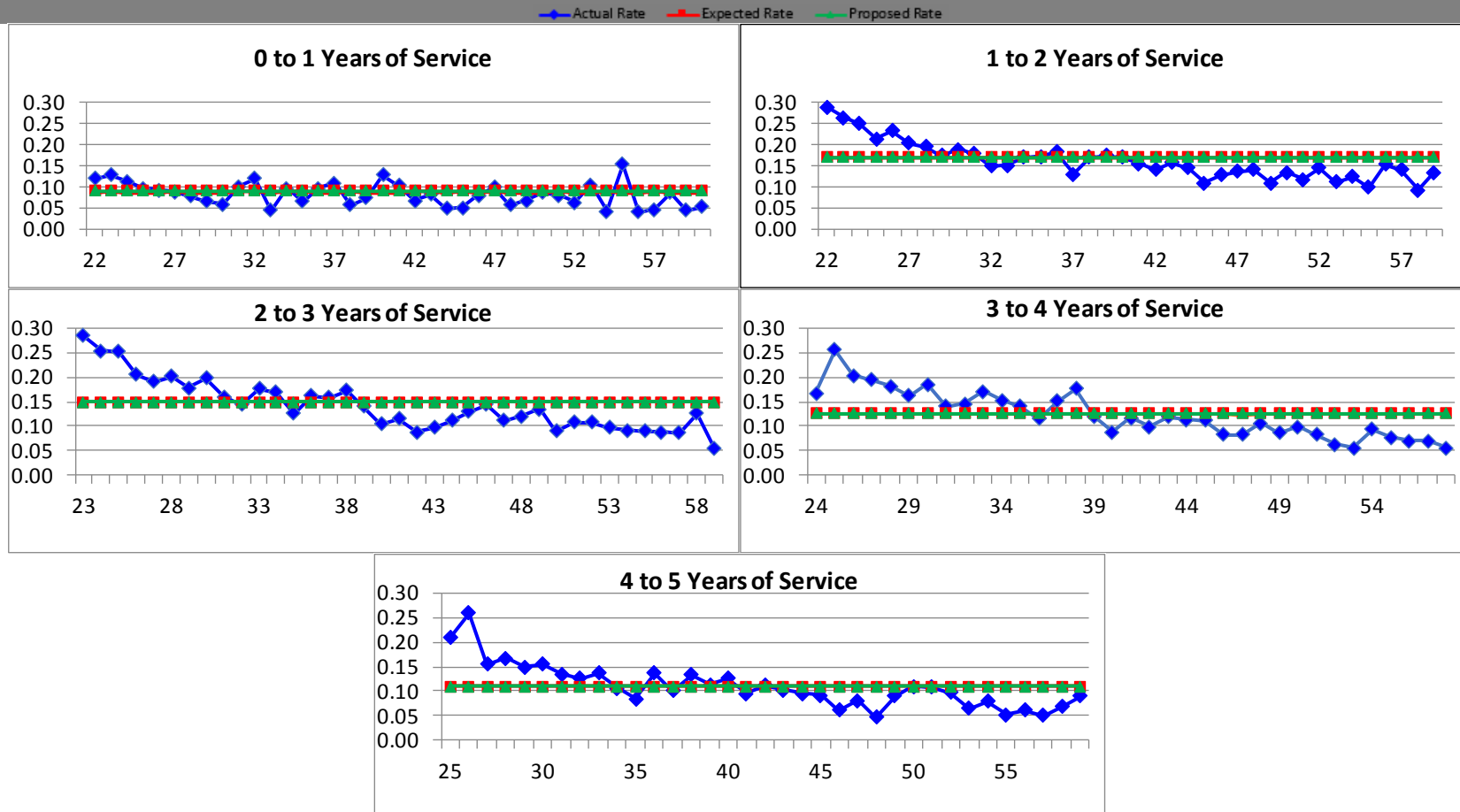
**Females**

Males and Females



# Termination (<5 Years of Service)

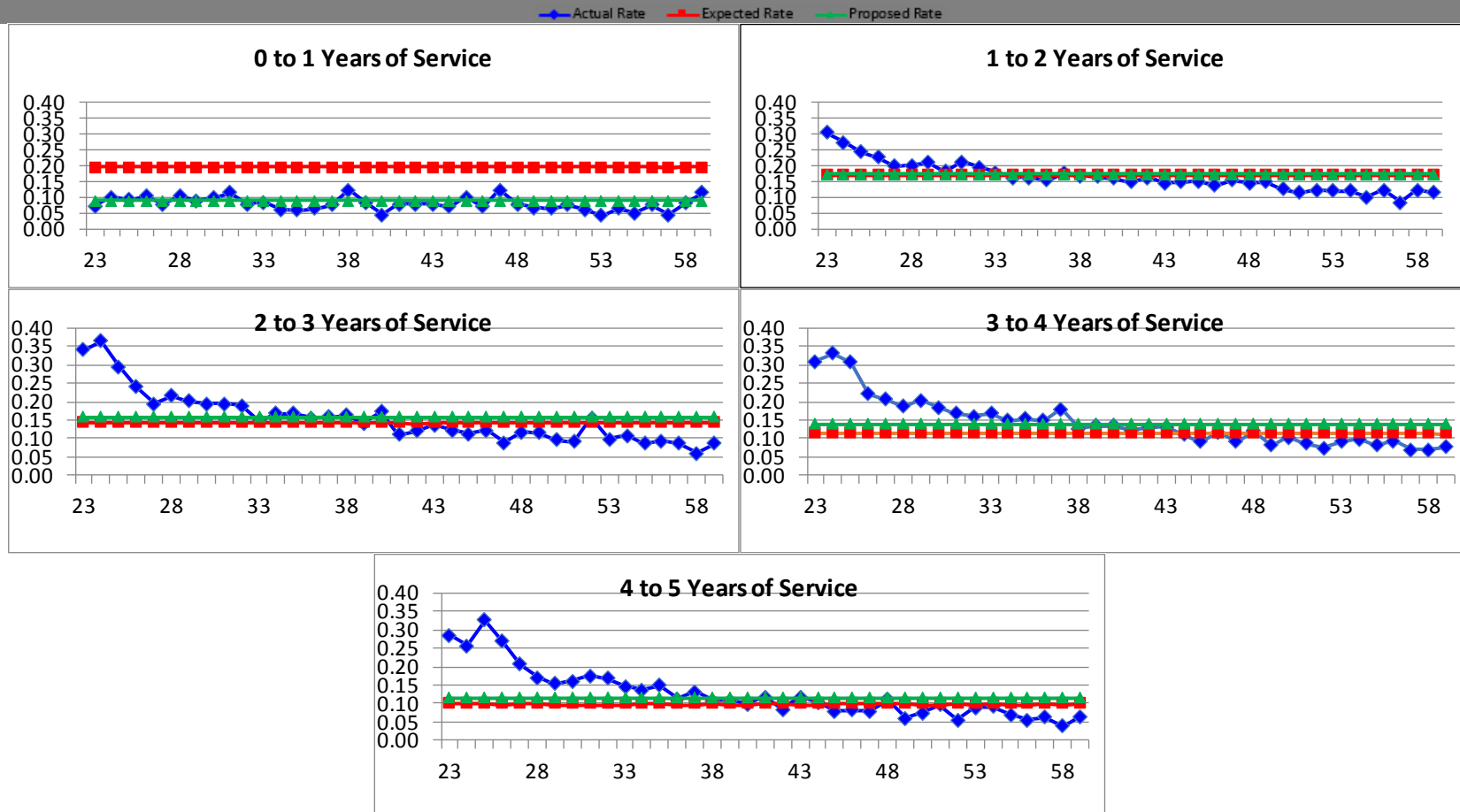
- Plan**
- TSERS:**
- Teachers
- General Employees**
- Other Education
  - Law Enforcement
  - CJRS
  - LRS
  - National Guard
  - DIPNC
  - FRSWPF
- LGERS:**
- General Employees
  - Fire & Rescue
  - Law Enforcement
  - RODs
  - Death
  - Membership
- Active**
- Retiree
  - Disabled
  - Beneficiary
  - Gender
- Males**
- Females
  - Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service over the period than expected overall other than the following groups:
0-1 years	578.00	1,224.72	0.4719	612.36	0.9439	0-1 years
1-2 years	3,181.00	2,865.35	1.1102	3,142.96	1.0121	
2-3 years	2,414	2,062.58	1.1704	2,379.90	1.0143	Recommendation: adjust rates, generally upw ards, to reflect actual experience
3-4 years	1,773	1,499.85	1.1821	1,704.38	1.0403	
4-5 years	1,327	1,073.25	1.2364	1,311.75	1.0116	Impact: minimal
Total	9,273	8,725.75	1.0627	9,151.35	1.0133	

# Termination (<5 Years of Service)

- Plan**
- TSERS:**
- Teachers
- General Employees**
- Other Education
  - Law Enforcement
  - CJRS
  - LRS
  - National Guard
  - DIPNC
  - FRSWPF
  - LGERS:
  - General Employees
  - Fire & Rescue
  - Law Enforcement
  - RODs
  - Death
  - Membership
- Active**
- Retiree
  - Disabled
  - Beneficiary
  - Gender
  - Males
- Females**
- Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service over the period than expected overall other than the following groups:
0-1 years	850.00	1,958.67	0.4340	904.14	0.9401	0-1 years
1-2 years	4,381.00	4,219.23	1.0383	4,343.33	1.0087	
2-3 years	3,352	3,044.49	1.1010	3,306.71	1.0137	Recommendation: adjust rates, generally downwards to reflect actual experience
3-4 years	2,481	2,033.93	1.2198	2,476.60	1.0018	
4-5 years	1,731	1,503.10	1.1516	1,728.57	1.0014	Impact: minimal
Total	12,795	12,759.42	1.0028	12,759.34	1.0028	

# Termination (<5 Years of Service)

**Plan**

**TSERS:**

- Teachers
- General Employees

**-Other Education**

- Law Enforcement
- CJRS
- LRS
- National Guard
- DIPNC
- FRSWPF

**LGERS:**

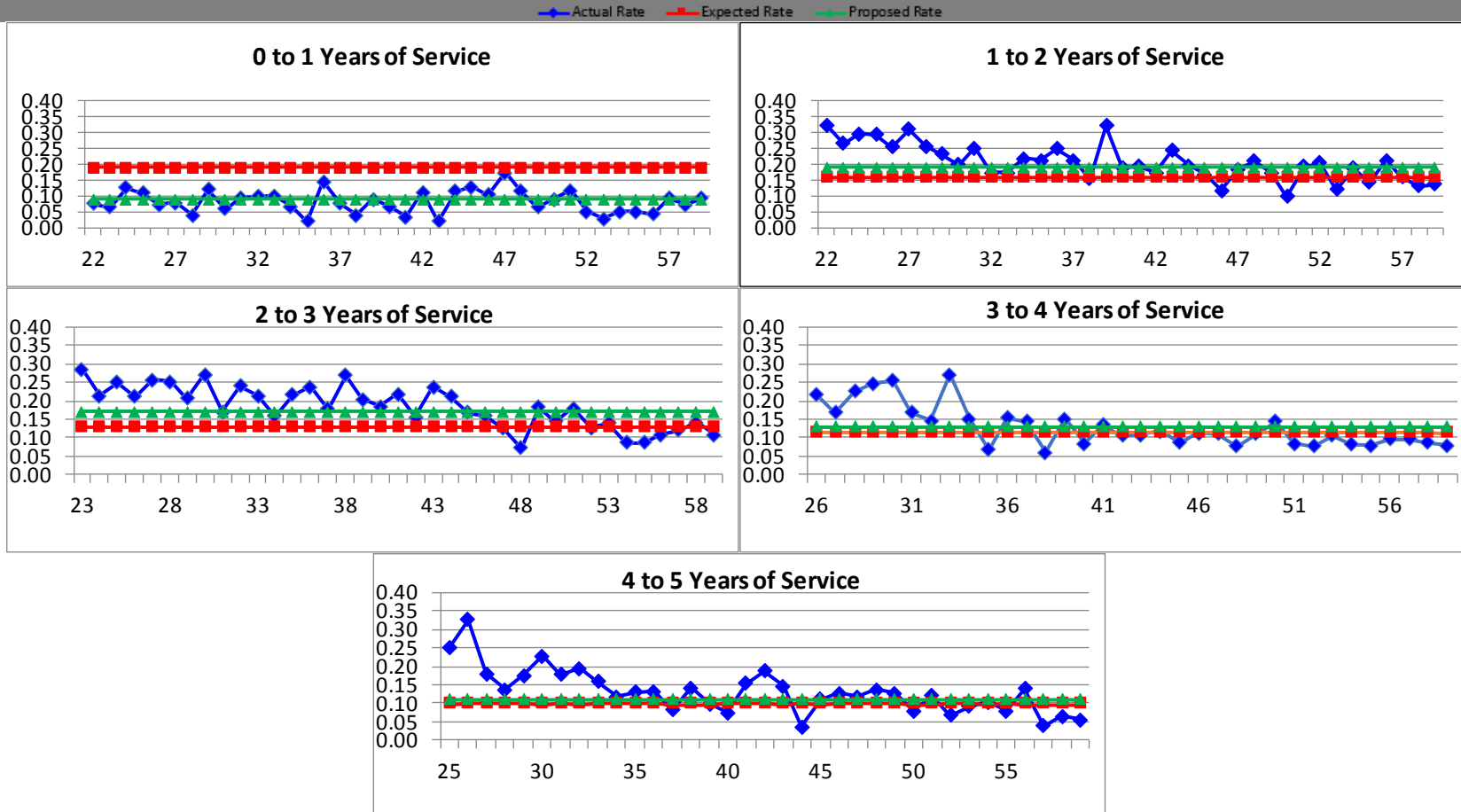
- General Employees
- Fire & Rescue
- Law Enforcement
- RODs
- Death
- Membership

**Active**

- Retiree
- Disabled
- Beneficiary
- Gender

**Males**

- Females
- Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service over the period than expected overall other than the following groups:
0-1 years	240.00	579.69	0.4140	274.59	0.8740	0-1 years
1-2 years	1,256.00	991.36	1.2669	1,177.24	1.0669	
2-3 years	905	671.06	1.3486	877.54	1.0313	Recommendation: adjust rates, generally up wards, to reflect actual experience
3-4 years	598	519.90	1.1502	587.60	1.0177	
4-5 years	444	383.40	1.1581	421.74	1.0528	Impact: minimal
Total	3,443	3,145.41	1.0946	3,338.71	1.0312	

# Termination (<5 Years of Service)

**Plan**

**TSERS:**

- Teachers
- General Employees

**-Other Education**

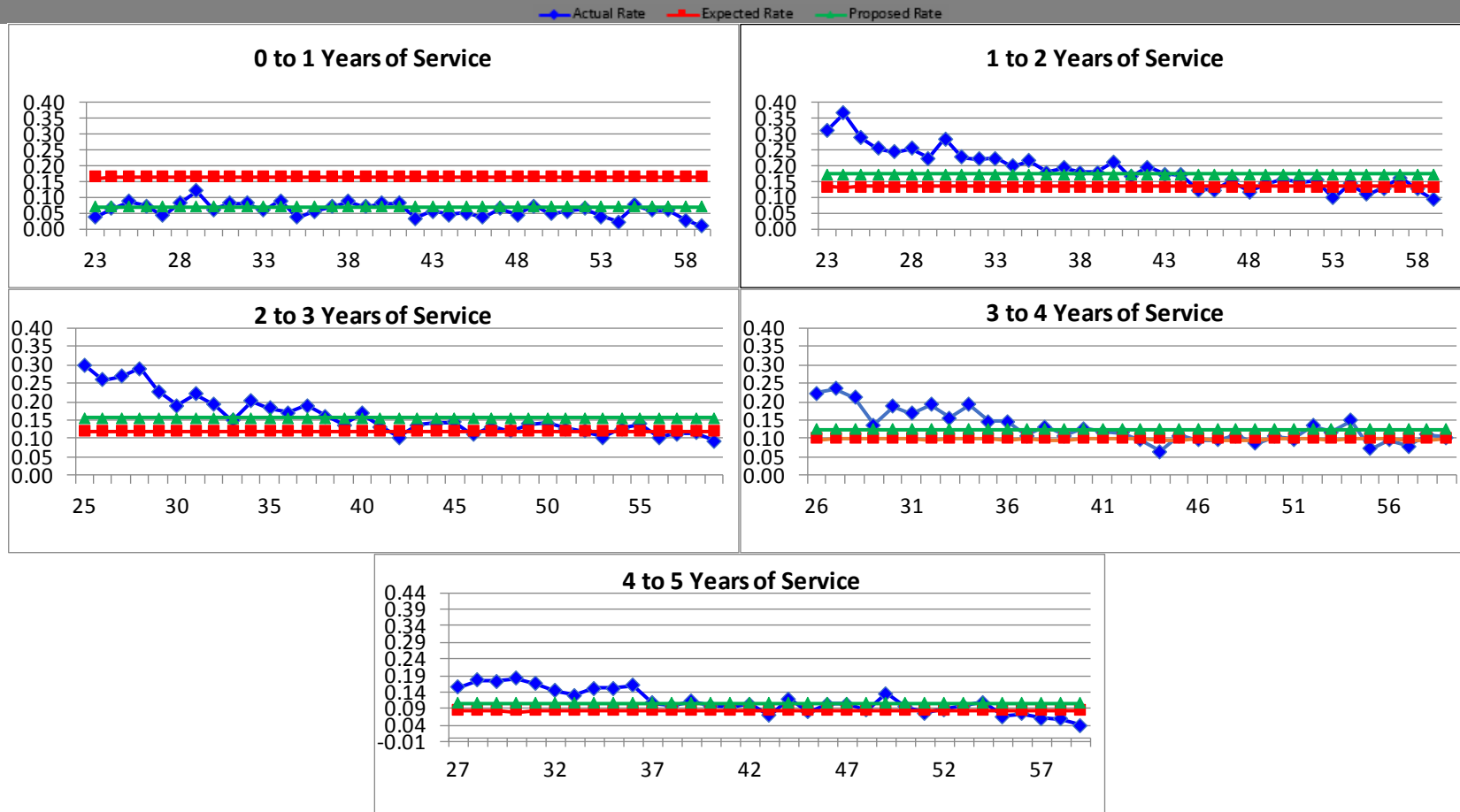
- Law Enforcement
- CJRS
- LRS
- National Guard
- DIPNC
- FRSWPF
- LGERS:
- General Employees
- Fire & Rescue
- Law Enforcement
- RODs
- Death
- Membership

**Active**

- Retiree
- Disabled
- Beneficiary
- Gender
- Males

**Females**

- Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service over the period than expected overall other than the following groups:
0-1 years	412.00	1,112.26	0.3704	472.08	0.8727	0-1 years
1-2 years	2,094.00	1,544.36	1.3559	2,002.00	1.0460	Recommendation: adjust rates, generally upw ards, to reflect actual experience
2-3 years	1,547	1,173.00	1.3188	1,515.13	1.0210	Impact: minimal
3-4 years	1,032	822.80	1.2543	1,028.50	1.0034	
4-5 years	768	597.66	1.2850	755.19	1.0170	
Total	5,853	5,250.08	1.1148	5,772.89	1.0139	

# Termination (<5 Years of Service)

**Plan**

**TSERS:**

- Teachers
- General Employees
- Other Education

**-Law Enforcement**

- CJRS
- LRS
- National Guard
- DIPNC
- FRSWPF

**LGERS:**

- General Employees
- Fire & Rescue
- Law Enforcement

RODs

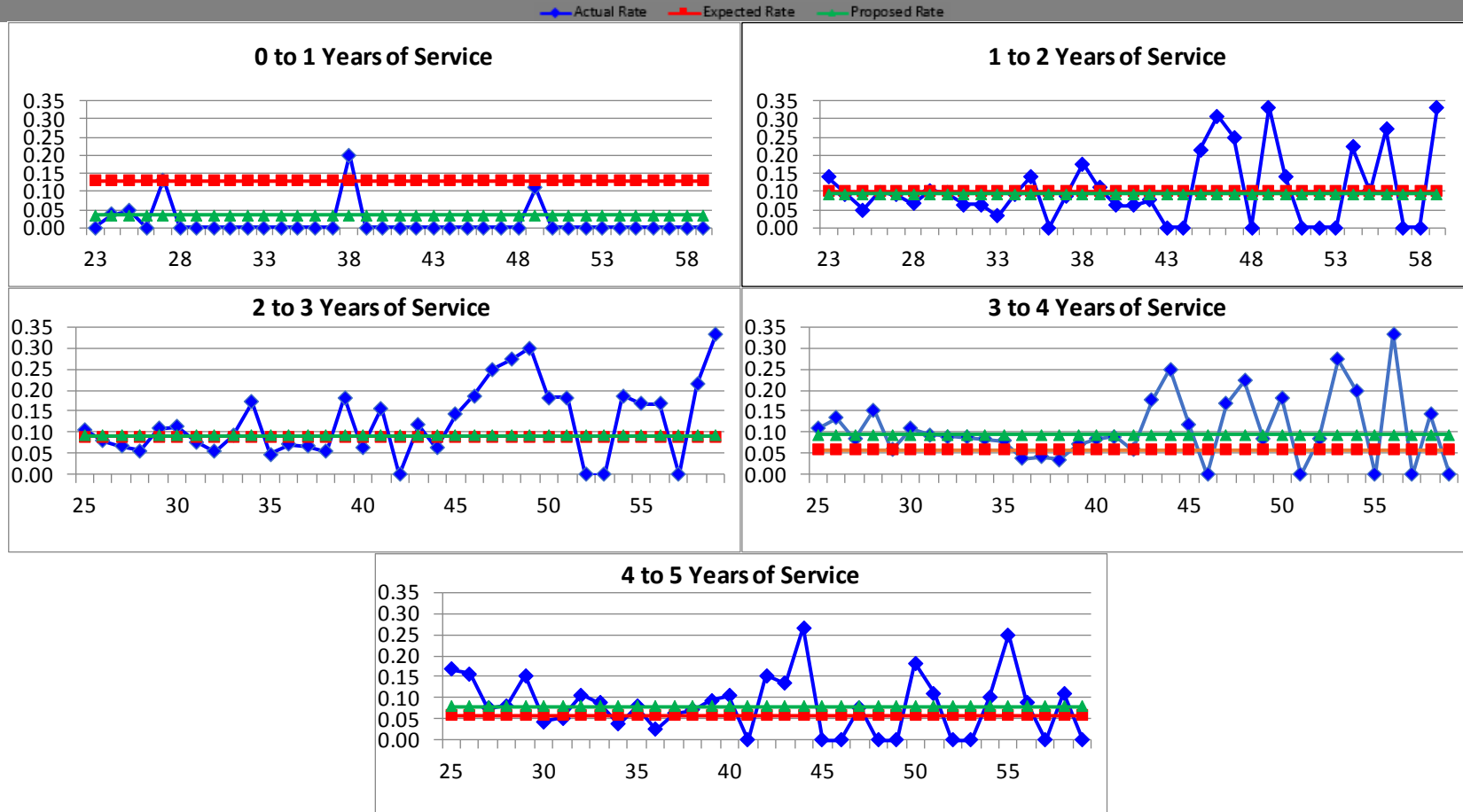
Death

Membership

**Active**

- Retiree
- Disabled
- Beneficiary
- Gender
- Males
- Females

**Males and Females**

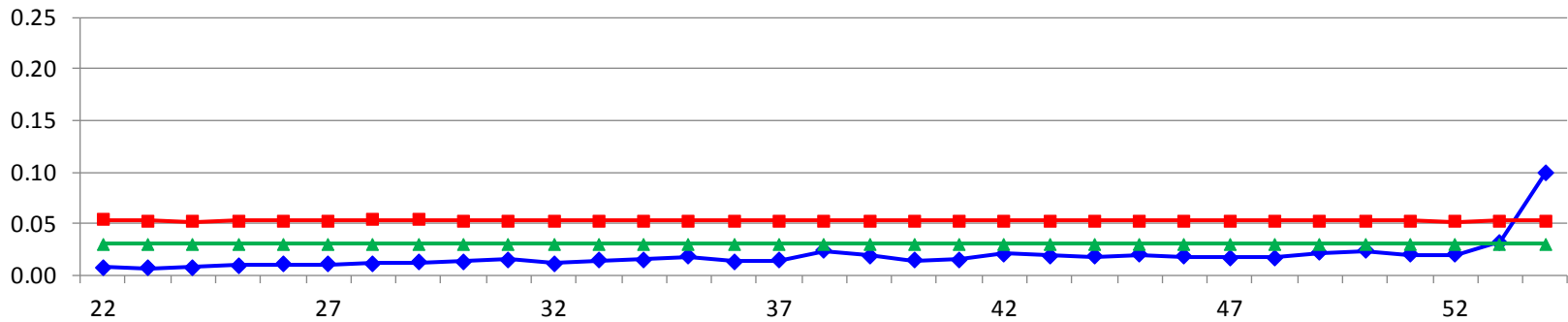


	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service over the period than expected overall other than the following groups: 0-1 years , 1-2 years Recommendation: adjust rates, generally upw ards, to reflect actual experience Impact: minimal
0-1 years	6.00	37.83	0.1586	10.19	0.5891	
1-2 years	117.00	128.20	0.9126	118.59	0.9866	
2-3 years	130	123.84	1.0497	127.28	1.0214	
3-4 years	129	75.36	1.7118	119.32	1.0811	
4-5 years	96	68.10	1.4097	90.80	1.0573	
Total	478	433.33	1.1031	466.17	1.0254	

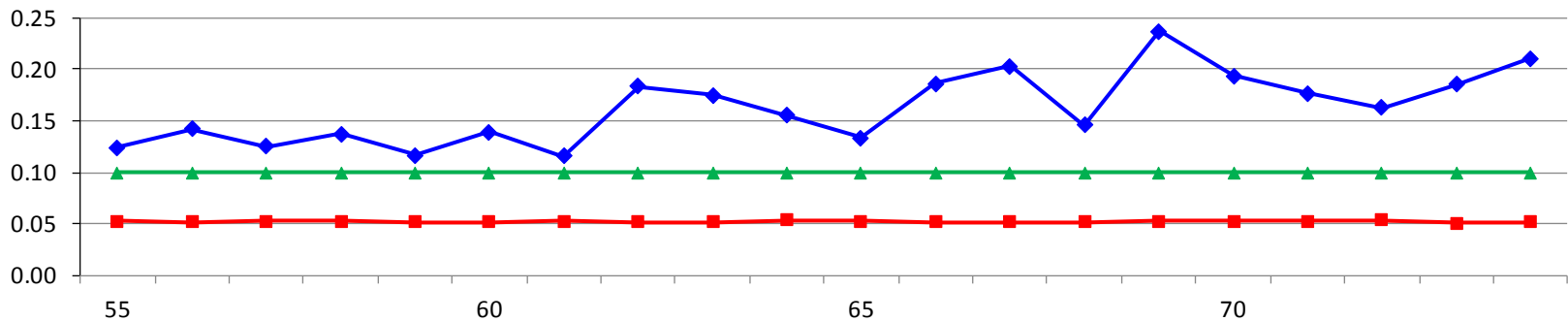
# Termination (<5 Years of Service)

Actual Rate Expected Rate Proposed Rate

## < Age 55, <5 Yrs of Service



## > Age 55, < 5 Yrs of Service



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er terminations with less than 5 years of service over the period than expected overall other than the follow ing groups:
0-1 years	811.00	2,915.97	0.2781	1,654.29	0.4902	1-2 years
1-2 years	556.00	196.28	2.8327	376.70	1.4760	
Total	1,367	3,112.25	0.4392	2,030.99	0.6731	Recommendation: adjust rates, generally down wards to reflect actual experience
						Impact: minimal

- Plan**
- TSERS:
  - Teachers
  - General Employees
  - Other Education
  - Law Enforcement
  - CJRS
  - LRS
  - National Guard
  - DIPNC
- FRSWPF**
- LGERS:
  - General Employees
  - Fire & Rescue
  - Law Enforcement
- RODs**
- Death
  - Membership
- Active**
- Retiree
  - Disabled
  - Beneficiary
  - Gender
  - Males
  - Females
- Males and Females**

# Termination (<5 Years of Service)

**Plan**

TSERS:

- Teachers
- General Employees
- Other Education
- Law Enforcement

CJRS

LRS

National Guard

DIPNC

FRSWPF

**LGERS:**

- General Employees
- Fire & Rescue
- Law Enforcement

**RODs**

Death

Membership

**Active**

Retiree

Disabled

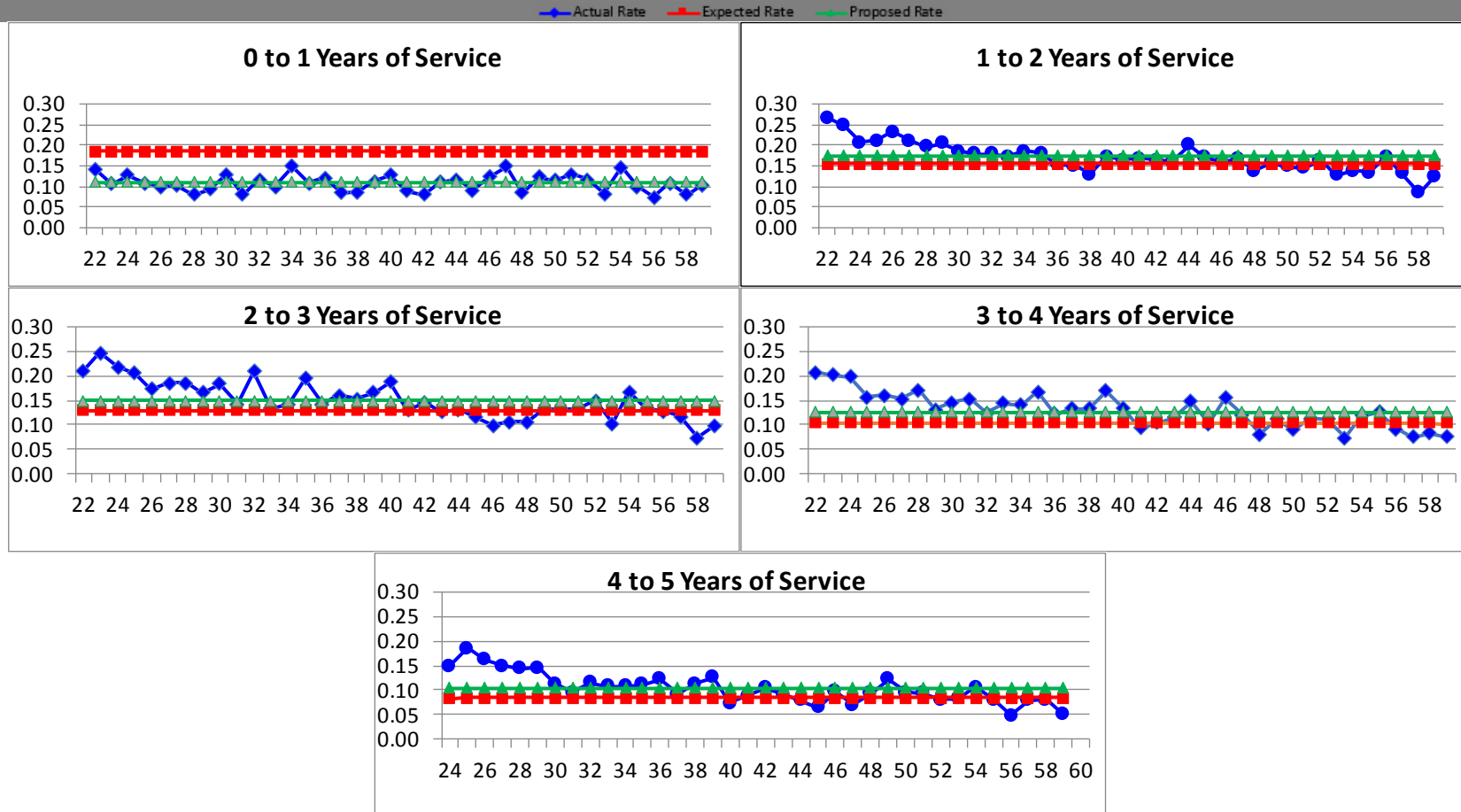
Beneficiary

Gender

**Males**

Females

Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service over the period than expected overall other than the following groups:
0-1 years	1,059.00	1,827.66	0.5794	1,086.58	0.9746	0-1 years
1-2 years	3,853.00	3,324.28	1.1590	3,753.58	1.0265	
2-3 years	2,725	2,254.98	1.2084	2,601.90	1.0473	Recommendation: adjust rates, generally upw ards, to reflect actual experience
3-4 years	1,843	1,495.79	1.2321	1,780.88	1.0349	
4-5 years	1,258	997.07	1.2617	1,230.92	1.0220	Impact: minimal
Total	10,738	9,899.78	1.0847	10,453.85	1.0272	

# Termination (<5 Years of Service)

**Plan**

TSERS:

- Teachers
- General Employees
- Other Education
- Law Enforcement

CJRS

LRS

National Guard

DIPNC

FRSWPF

**LGERS:**

- General Employees
- Fire & Rescue
- Law Enforcement

**RODs**

Death

Membership

**Active**

Retiree

Disabled

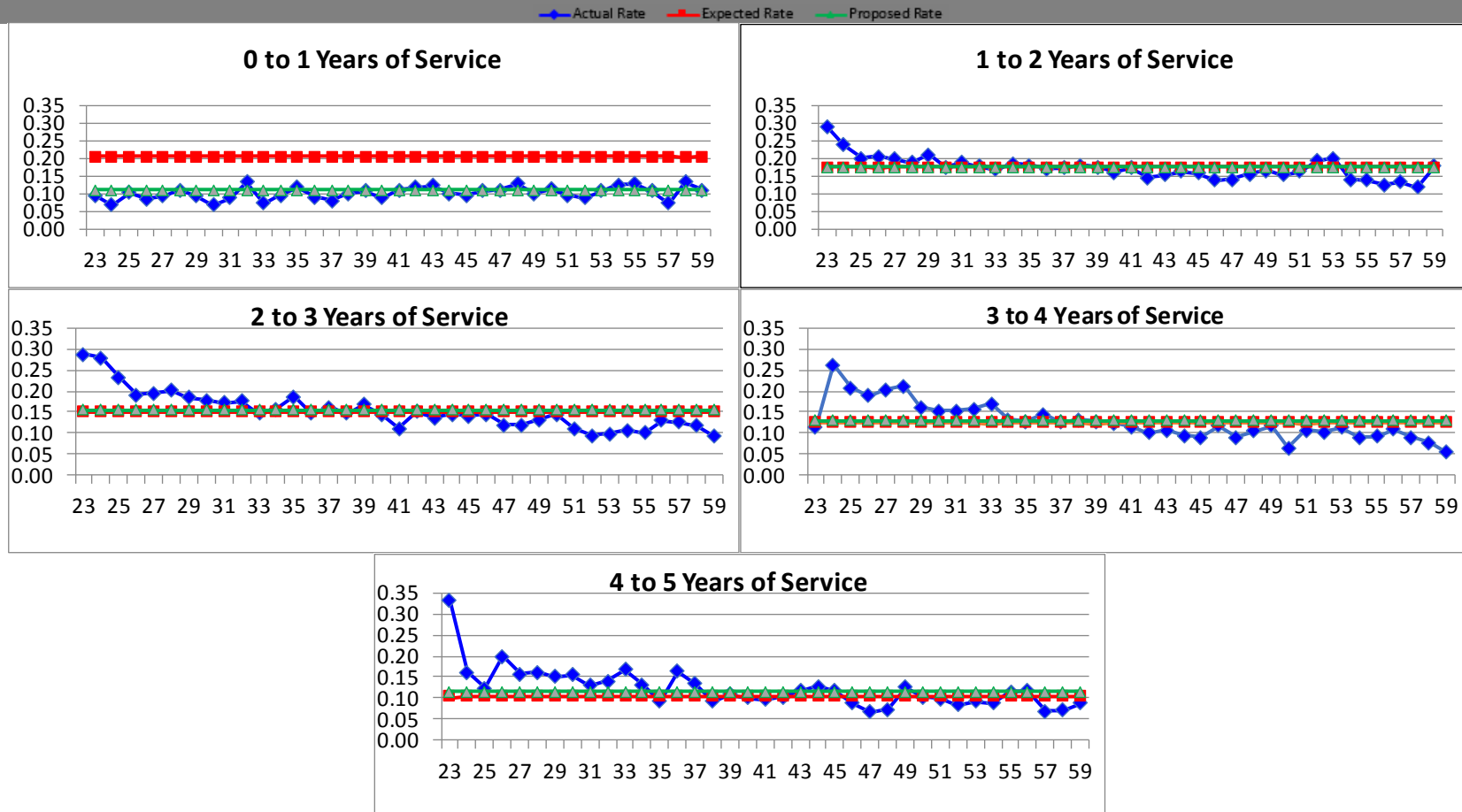
Beneficiary

Gender

Males

**Females**

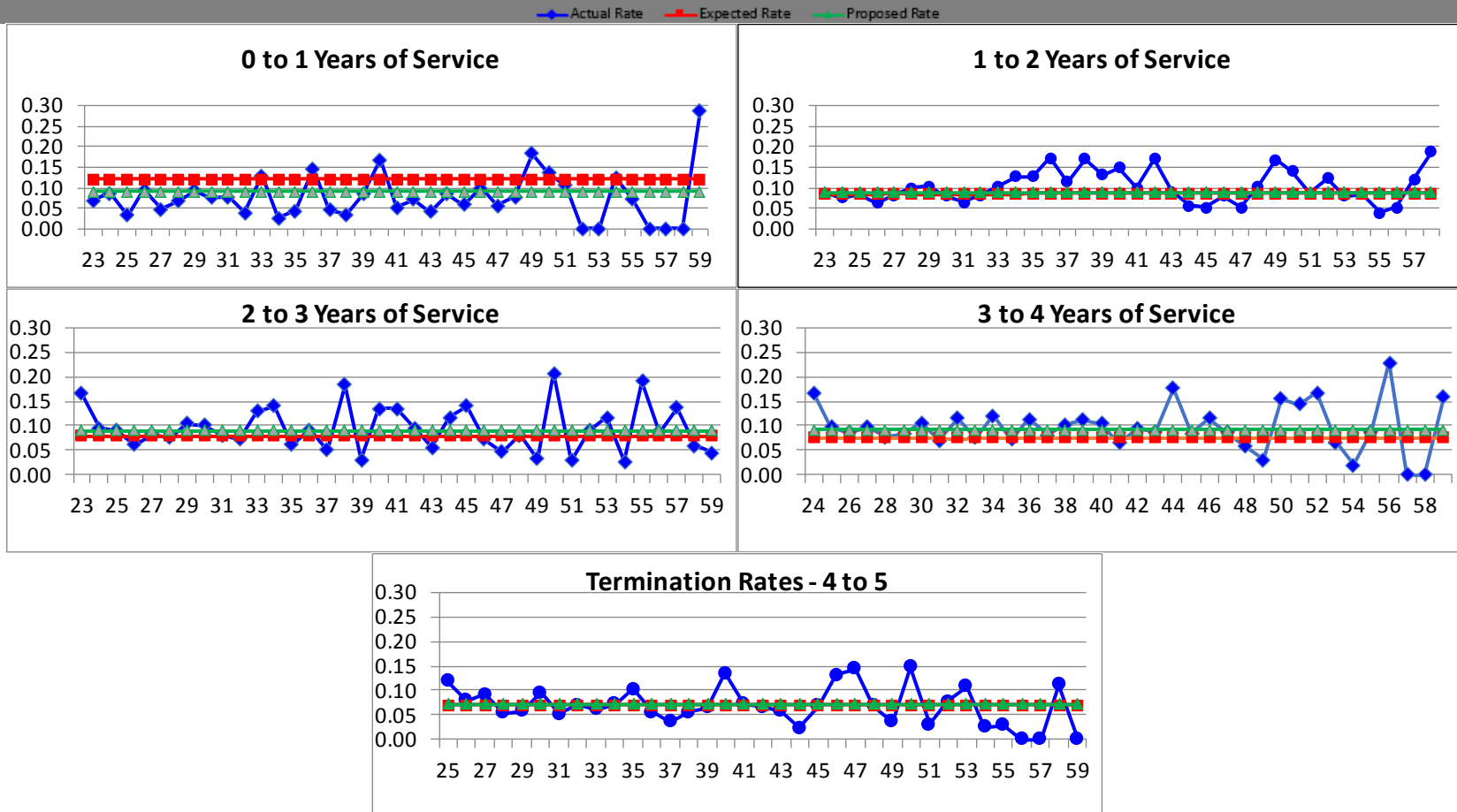
Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: few er terminations with less than 5 years of service over the period than expected overall other than the follow ing groups:
0-1 years	1,139.00	2,332.17	0.4884	1,251.69	0.9100	1-2 years, 2-3 years, 3-4 years, 4-5 years
1-2 years	4,619.00	4,537.52	1.0180	4,537.05	1.0181	
2-3 years	3,372	3,235.35	1.0422	3,343.20	1.0086	Recommendation: adjust rates, generally dowa nwards to reflect actual experience
3-4 years	2,315	2,202.91	1.0509	2,290.34	1.0108	
4-5 years	1,713	1,531.66	1.1184	1,677.74	1.0210	Impact: minimal
Total	13,158	13,839.61	0.9507	13,100.01	1.0044	

# Termination (<5 Years of Service)

- Plan**
- TSERS:
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	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service over the period than expected overall other than the following groups:
0-1 years	148.00	242.28	0.6109	181.71	0.8145	0-1 years
1-2 years	584.00	539.52	1.0824	554.84	1.0526	
2-3 years	583	507.36	1.1491	570.78	1.0214	Recommendation: adjust rates, generally up wards, to reflect actual experience
3-4 years	573	450.08	1.2731	554.54	1.0333	
4-5 years	399	380.45	1.0488	394.04	1.0126	Impact: minimal
Total	2,287	2,119.69	1.0789	2,255.90	1.0138	

# Termination (5+ Years of Service)

**Plan**

**TSERS:**

**-Teachers**

-General Employees

-Other Education

-Law Enforcement

CJRS

LRS

National Guard

DIPNC

FRSWPF

LGERS:

-General Employees

-Fire & Rescue

-Law Enforcement

RODs

Death

Membership

**Active**

Retiree

Disabled

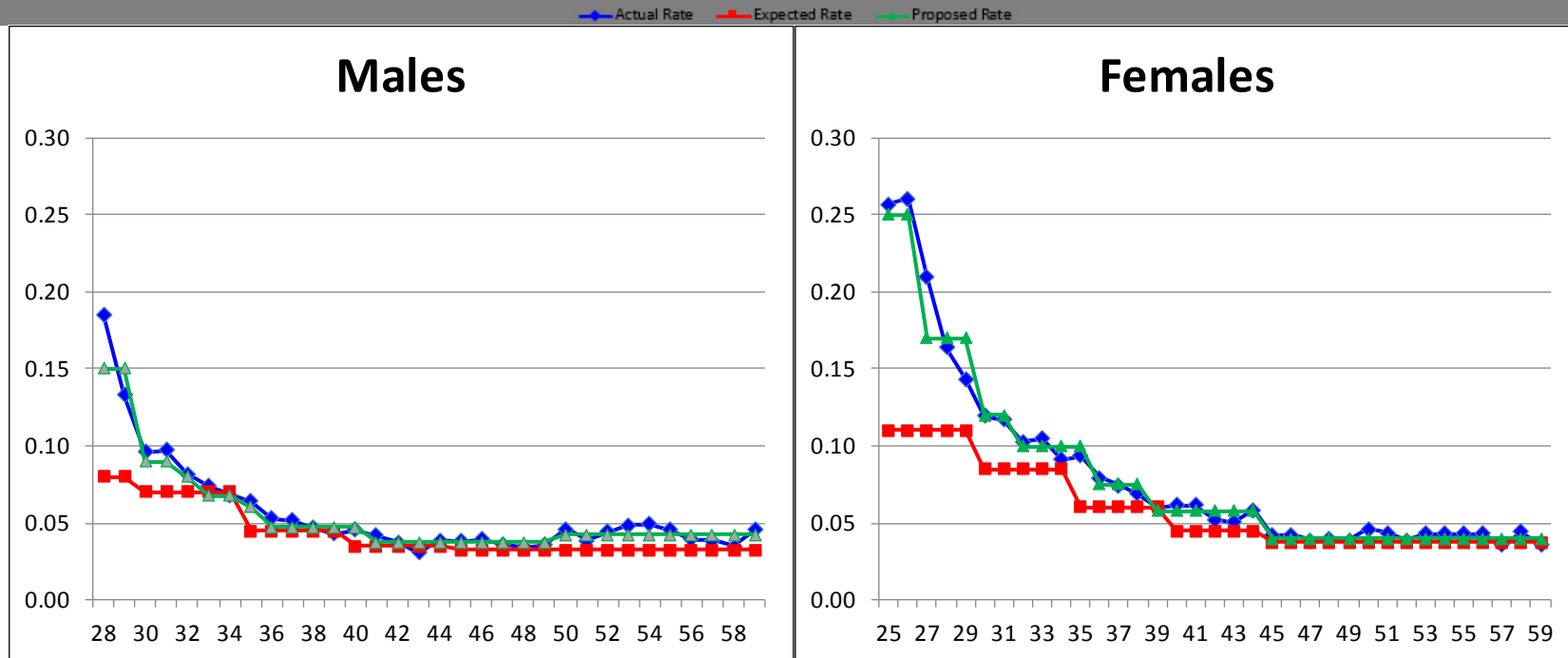
Beneficiary

Gender

**Males**

**Females**

Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with more than 5 years of service over the period than expected overall
Males	3,818.00	3,153.41	1.2108	3,762.83	1.0147	
Females	15,404.00	13,641.03	1.1292	15,285.14	1.0078	
Total	19,222	16,794.44	1.1445	19,047.98	1.0091	Recommendation: adjust rates, generally up wards, to reflect actual experience
						Impact: decrease

# Termination (5+ Years of Service)

**Plan**

**TSERS:**

- Teachers

**-General Employees**

- Other Education
- Law Enforcement
- CJRS
- LRS
- National Guard
- DIPNC
- FRSWPF
- LGERS:
- General Employees
- Fire & Rescue
- Law Enforcement
- RODs
- Death
- Membership

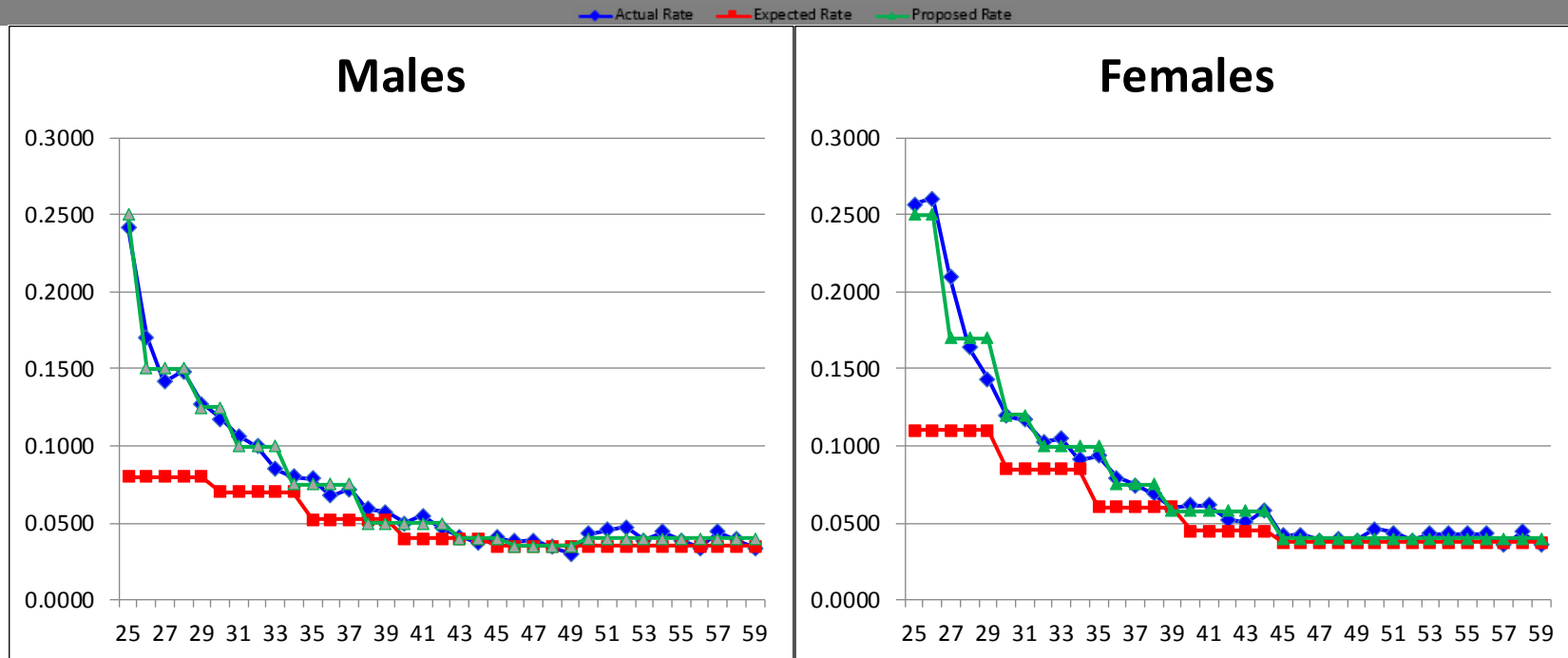
**Active**

- Retiree
- Disabled
- Beneficiary
- Gender

**Males**

**Females**

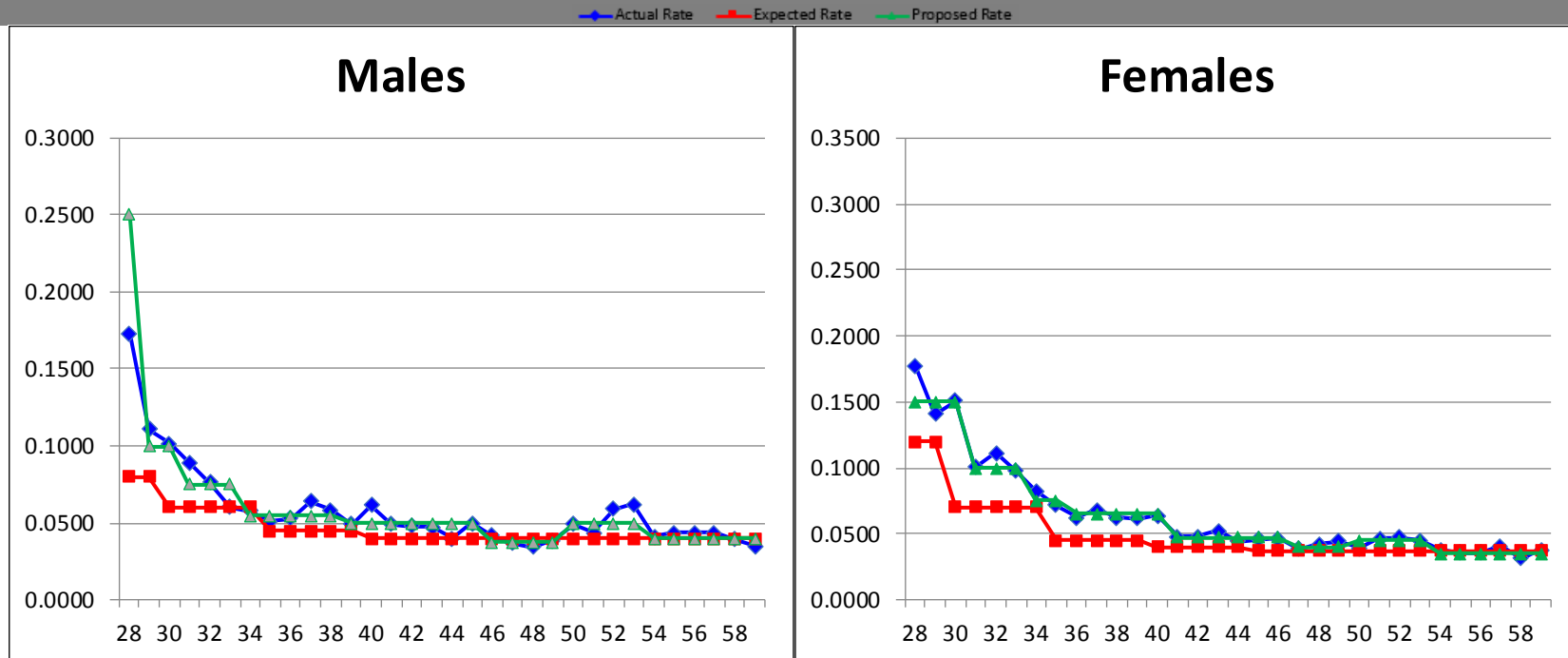
Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with more than 5 years of service over the period than expected overall
Males	5,521.00	4,577.57	1.2061	5,479.16	1.0076	Recommendation: adjust rates, generally up wards, to reflect actual experience Impact: decrease
Females	7,646.00	6,464.54	1.1828	7,636.44	1.0013	
Total	13,167	11,042.11	1.1924	13,115.60	1.0039	

# Termination (5+ Years of Service)

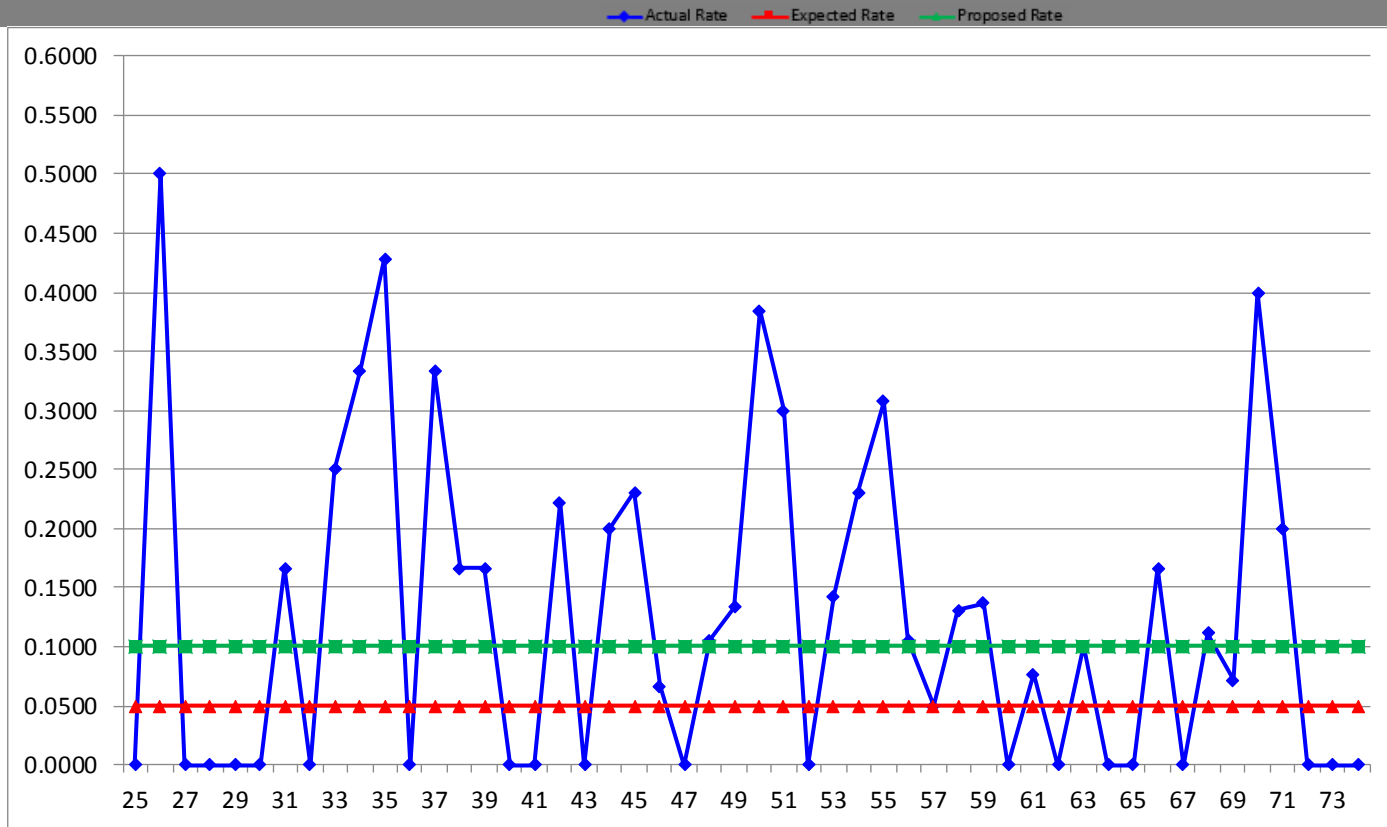
- Plan**
- TSERS:**
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	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with more than 5 years of service over the period than expected overall
Males	1,607.00	1,371.04	1.1721	1,589.40	1.0111	
Females	3,896.00	3,241.25	1.2020	3,843.31	1.0137	
Total	5,503	4,612.29	1.1931	5,432.71	1.0129	Recommendation: adjust rates, generally up wards, to reflect actual experience
						Impact: decrease

# Termination (5+ Years of Service)

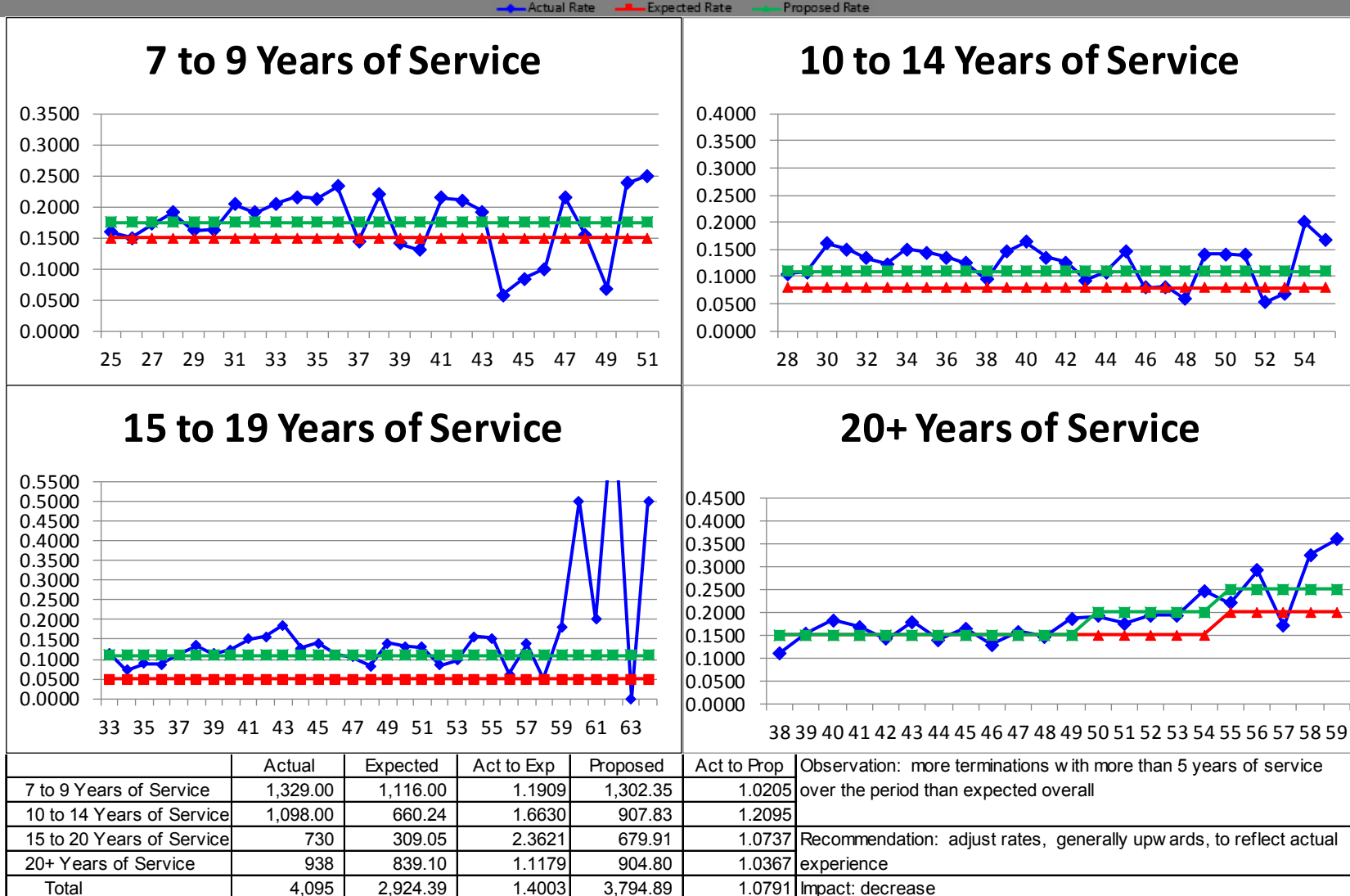
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    - Other Education
    - Law Enforcement
  - CJRS
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  - Disabled
  - Beneficiary
  - Gender
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    - Females
  - Males and Females**



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with more than 5 years of service over the period than expected overall
Total	67.00	26.85	2.4953	53.70	1.2477	
Total	67.00	26.85	2.4953	53.70	1.2477	Recommendation: adjust rates, generally upwards, to reflect actual experience
						Impact: minimal

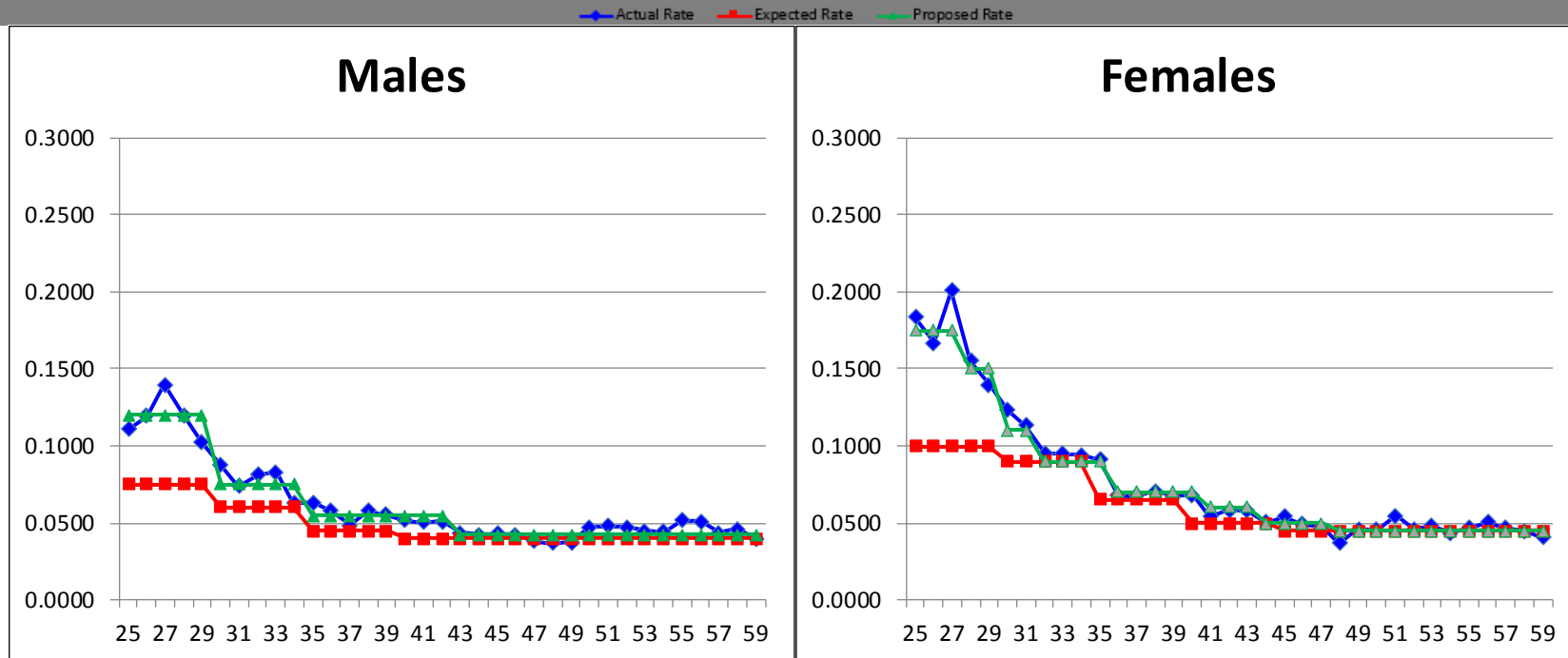
# Termination (5+ Years of Service)

- Plan**
- TSERS:
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# Termination (5+ Years of Service)

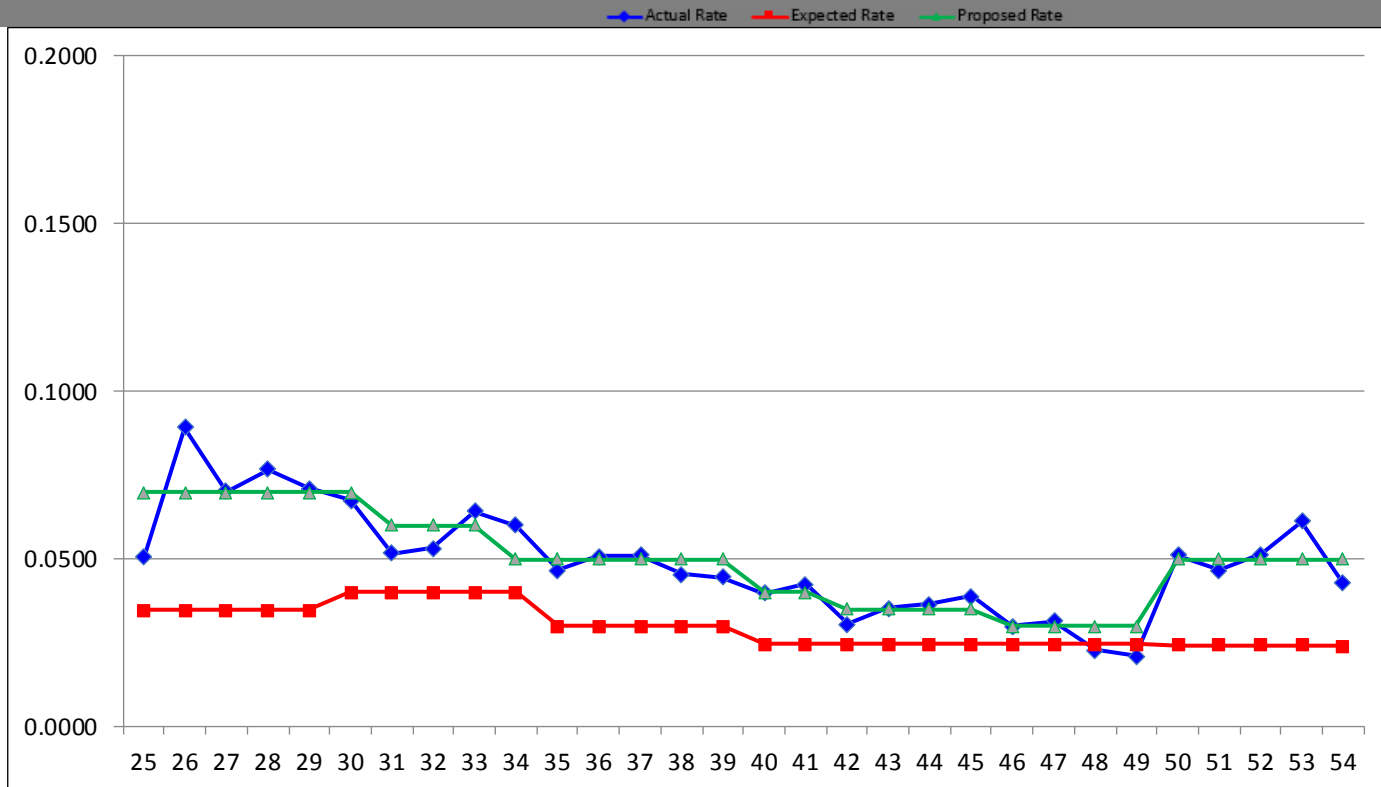
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- TSERS:
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	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with more than 5 years of service over the period than expected overall
Males	4,925.00	4,174.27	1.1798	4,884.85	1.0082	
Females	6,785.00	6,188.16	1.0964	6,770.28	1.0022	
Total	11,710	10,362.43	1.1300	11,655.13	1.0047	Recommendation: adjust rates, generally up wards, to reflect actual experience
						Impact: decrease

# Termination (5+ Years of Service)

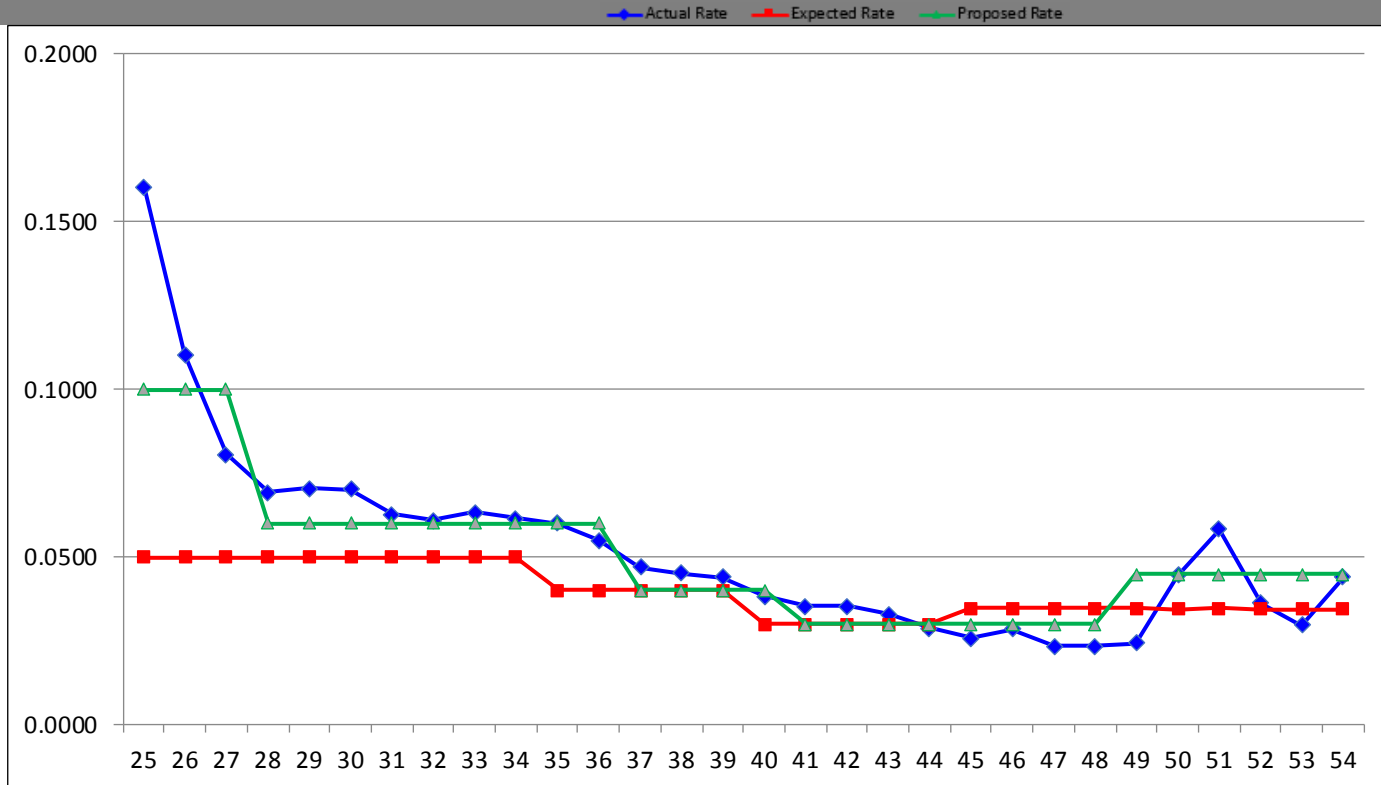
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  - Beneficiary
  - Gender
  - Males**
  - Females**
  - Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with more than 5 years of service over the period than expected overall
Total	1,557.00	1,003.31	1.5519	1,573.63	0.9894	
Total	1,557.00	1,003.31	1.5519	1,573.63	0.9894	Recommendation: adjust rates, generally upwards, to reflect actual experience
						Impact: decrease

# Termination (5+ Years of Service)

- Plan**
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  - Law Enforcement
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- Gender**
- Males**
- Females
  - Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with more than 5 years of service over the period than expected overall
Total	2,809.00	2,497.43	1.1248	2,817.83	0.9969	
Total	2,809.00	2,497.43	1.1248	2,817.83	0.9969	Recommendation: adjust rates, generally upwards, to reflect actual experience
						Impact: minimal

# Salary Increases

- Generally, a participant's compensation will increase over the long term based on Inflation + Productivity Growth + Merit Adjustments
- We recommend Inflation be reduced to 2.50%
- We recommend Productivity Growth be increased to 0.75%
- Merit Adjustments are increases in a member's salary unrelated to above
  - Removed Inflation and Productivity Growth from actual salaries to determine Merit Adjustments for each member over 2015 – 2019
  - Studied Merit Adjustments by service and employee group
- Overall salary increases were generally lower across all groups
- Higher (lower) salary increases result in higher (lower) estimated benefits and higher (lower) projected costs.
- Because contributions are financed over projected payroll, higher (lower) salary increases tend to defer (accelerate) employer contributions.

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