

## Disability Rates

### PERS

#### Past Experience

We analyzed the data by looking at overall fit by year, as well as all data combined by plan, age, and gender to make slight adjustments to the Public Employees' Retirement System (PERS) disability rates.

#### PERS 1

PERS 1 Disability Counts by Year			
(Males and Females)			
Year	Actual	Expected	Ratio
1995	108	100	1.08
1996	86	98	0.88
1997	83	96	0.86
1998	101	93	1.09
1999	96	88	1.09
2000	72	83	0.87
2001	68	78	0.87
2002	63	71	0.89
2003	69	64	1.07
2004	60	59	1.01
2005	40	53	0.75
2006	34	48	0.71
2007	13	41	0.31
2008	17	35	0.48
2009	19	30	0.63
2010	15	24	0.63
2011	13	19	0.67
2012	2	15	0.14
<b>Total</b>	<b>959</b>	<b>1,096</b>	<b>0.87</b>

The table on the left shows the year-by-year Actual and Expected disabilities for PERS 1, as well as the Ratio of Actual-to-Expected (A/E) counts.

The table below shows the A/E ratios for PERS 1 after we removed the data as described in the Data section.

PERS 1 Disability Counts by Age						
Age	Male			Female		
	Actual	Expected	Ratio	Actual	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	0	0.00	0	0	0.00
30-34	0	0	0.00	0	0	0.00
35-39	1	1	1.86	0	1	0.00
40-44	13	11	1.15	26	19	1.37
45-49	60	59	1.02	82	69	1.19
50-54	127	150	0.85	182	200	0.91
55-59	164	194	0.85	218	243	0.90
60-64	3	14	0.22	2	8	0.26
65+	0	6	0.00	0	3	0.00
<b>Total</b>	<b>368</b>	<b>434</b>	<b>0.85</b>	<b>510</b>	<b>543</b>	<b>0.94</b>

**PERS 2/3**

The table to the right shows the year-by-year Actual and Expected disabilities for PERS 2/3, as well as the Ratio of A/E counts.

<b>PERS 2/3 Disability Counts by Year (Males and Females)</b>			
<b>Year</b>	<b>Actual</b>	<b>Expected</b>	<b>Ratio</b>
1995	62	84	0.74
1996	85	91	0.94
1997	73	98	0.74
1998	109	105	1.04
1999	134	112	1.19
2000	121	120	1.01
2001	116	129	0.90
2002	153	137	1.11
2003	150	146	1.02
2004	159	155	1.02
2005	162	165	0.98
2006	159	174	0.92
2007	109	183	0.60
2008	116	195	0.60
2009	97	205	0.47
2010	108	209	0.52
2011	110	209	0.53
2012	72	207	0.35
<b>Total</b>	<b>2,095</b>	<b>2,725</b>	<b>0.77</b>

The following table displays the A/E ratios for PERS 2/3 after we removed the data as described in the Data section.

PERS 2/3 Disability Counts by Age						
Age	Male			Female		
	Actual	Expected	Ratio	Actual	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	2	4	0.50	2	1	2.52
30-34	5	10	0.51	2	9	0.23
35-39	14	17	0.81	15	26	0.58
40-44	37	35	1.05	30	39	0.77
45-49	76	72	1.05	103	75	1.37
50-54	139	120	1.16	133	134	0.99
55-59	199	187	1.07	201	200	1.01
60-64	203	215	0.95	193	204	0.95
65+	11	23	0.48	2	19	0.10
<b>Total</b>	<b>686</b>	<b>682</b>	<b>1.01</b>	<b>681</b>	<b>707</b>	<b>0.96</b>

◆ **Unisex Rates.**

We considered creating unisex rates for all plans. However, we found that male and female rates are materially different and, ultimately, chose to continue to distinguish rates by gender.

### Methods and Format of Assumptions

Whenever we consider changes to methods and formats of assumptions we must balance the desire for precision with the potential for increasing the complexity of the model. We considered alternate formats for the assumptions and, ultimately, decided not to make any changes. For reference, we considered, but did not adopt:

◆ **Separate rates for PERS 3 members.**

Even though PERS 3 had lower actual disability rates than PERS 2, we declined to make that change due to the relative lack of plan experience in PERS 3.

◆ **Separate duty-related disability rates for Plan 1 members.**

We found that our old assumption that 10 percent of all disabilities are duty-related continues to fit the experience very well.

### Best Estimate PERS Disability Rates

The tables below show a sampling of the Old, Actual, and New Rates for PERS.

PERS 1 Disability Rates						
Age	Old Rates		Actual Rates		New Rates	
	Male	Female	Male	Female	Male	Female
20	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
30	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
35	0.000310	0.000319	0.000000	0.000000	0.000310	0.000319
40	0.000762	0.000710	0.002336	0.001239	0.000762	0.000710
45	0.001481	0.001431	0.002086	0.001389	0.001481	0.001431
50	0.002542	0.003023	0.002203	0.003607	0.002542	0.003023
55	0.008240	0.006411	0.007893	0.007860	0.008240	0.006411
60	0.011701	0.006502	0.003040	0.000000	0.007541	0.003458
65	0.011701	0.005495	0.000000	0.000000	0.002204	0.000386
70	0.011701	0.005495	0.000000	0.000000	0.000644	0.000043
75	0.011701	0.005495	0.000000	0.000000	0.000188	0.000005
80	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

PERS 2/3 Disability Rates						
Age	Old Rates		Actual Rates		New Rates	
	Male	Female	Male	Female	Male	Female
20	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25	0.000052	0.000000	0.000000	0.000000	0.000052	0.000000
30	0.000115	0.000056	0.000081	0.000000	0.000115	0.000056
35	0.000156	0.000194	0.000170	0.000153	0.000156	0.000194
40	0.000235	0.000275	0.000232	0.000297	0.000235	0.000275
45	0.000476	0.000467	0.000420	0.000483	0.000476	0.000467
50	0.000922	0.001003	0.000874	0.001031	0.000922	0.001003
55	0.002630	0.002782	0.002906	0.003207	0.002630	0.002782
60	0.007603	0.007681	0.006717	0.007763	0.007863	0.007681
65	0.010244	0.010271	0.009153	0.000000	0.006146	0.005257
70	0.010244	0.010271	0.000000	0.000000	0.001358	0.001315
75	0.010244	0.010271	0.033898	0.000000	0.000300	0.000329
80	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

The tables on this page show the A/E disabilities for PERS by age under both the Old and New disability assumptions, as well as the Ratio of New Rates to Actual disabilities.

PERS 1 A/E Disability Counts								
Age	Male				Female			
	Actual	Expected		Ratio	Actual	Expected		Ratio
		Old Rates	New Rates			Old Rates	New Rates	
20-24	0	0	0	0.00	0	0	0	0.00
25-29	0	0	0	0.00	0	0	0	0.00
30-34	0	0	0	0.00	0	0	0	0.00
35-39	1	1	1	1.86	0	1	1	0.00
40-44	13	11	11	1.15	26	19	19	1.37
45-49	60	59	59	1.02	82	69	69	1.19
50-54	127	150	150	0.85	182	200	200	0.91
55-59	164	194	187	0.88	218	243	238	0.92
60-64	3	14	6	0.47	2	8	3	0.73
65+	0	6	1	0.00	0	3	0	0.00
<b>Total</b>	<b>368</b>	<b>434</b>	<b>415</b>	<b>0.89</b>	<b>510</b>	<b>543</b>	<b>529</b>	<b>0.96</b>

PERS 2/3 A/E Disability Counts								
Age	Male				Female			
	Actual	Expected		Ratio	Actual	Expected		Ratio
		Old Rates	New Rates			Old Rates	New Rates	
20-24	0	0	0	0.00	0	0	0	0.00
25-29	2	4	4	0.50	2	1	1	2.52
30-34	5	10	10	0.51	2	9	9	0.23
35-39	14	17	17	0.81	15	26	26	0.58
40-44	37	35	35	1.05	30	39	39	0.77
45-49	76	72	72	1.05	103	75	75	1.37
50-54	139	120	120	1.16	133	134	134	0.99
55-59	199	187	197	1.01	201	200	200	1.01
60-64	203	215	224	0.91	193	204	192	1.01
65+	11	23	7	1.63	2	19	5	0.42
<b>Total</b>	<b>686</b>	<b>682</b>	<b>686</b>	<b>1.00</b>	<b>681</b>	<b>707</b>	<b>680</b>	<b>1.00</b>

## TRS

### Past Experience

We analyzed the data by looking at overall fit by year, as well as all data combined by plan, age, and gender to make slight adjustments to the Teachers' Retirement System (TRS) Plan 1 disability rates. We did not change TRS 2/3 disability rates as part of this study.

### TRS 1

TRS 1 Disability Counts by Year (Males and Females)			
Year	Actual	Expected	Ratio
1995	36	33	1.08
1996	31	33	0.93
1997	32	33	0.97
1998	36	32	1.11
1999	30	31	0.96
2000	19	29	0.65
2001	38	26	1.46
2002	20	23	0.87
2003	21	20	1.04
2004	11	17	0.65
2005	10	14	0.71
2006	8	11	0.71
2007	5	8	0.60
2008	3	6	0.50
2009	2	4	0.46
2010	2	3	0.63
2011	2	2	0.95
2012	0	1	0.00
<b>Total</b>	<b>306</b>	<b>329</b>	<b>0.93</b>

The table to the left shows the year-by-year actual and expected disabilities for TRS 1, as well as the Ratio of A/E counts.

The following table shows the A/E ratios for TRS 1 after we removed the data as described in the Data section.

Age	Male			Female		
	Actual	Expected	Ratio	Actual	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	0	0.00	0	0	0.00
30-34	0	0	0.00	0	0	0.00
35-39	0	0	0.00	0	0	0.00
40-44	2	2	0.91	7	5	1.41
45-49	14	19	0.74	34	35	0.96
50-54	47	48	0.97	88	92	0.96
55-59	15	15	0.98	56	75	0.75
60-64	0	1	0.00	0	2	0.00
65+	0	0	0.00	0	0	0.00
<b>Total</b>	<b>78</b>	<b>86</b>	<b>0.91</b>	<b>185</b>	<b>209</b>	<b>0.89</b>

**TRS 2/3**

The table below shows the year-by-year Actual and Expected disabilities for TRS 2/3, as well as the Ratio of A/E counts.

TRS 2/3 Disability Counts by Year (Males and Females)			
Year	Actual	Expected	Ratio
1995	4	6	0.62
1996	7	7	0.95
1997	8	8	0.97
1998	11	9	1.25
1999	8	10	0.82
2000	11	10	1.05
2001	18	11	1.58
2002	18	13	1.43
2003	9	13	0.67
2004	26	14	1.83
2005	12	15	0.80
2006	14	16	0.88
2007	8	16	0.48
2008	7	17	0.42
2009	5	17	0.30
2010	9	17	0.53
2011	5	16	0.31
2012	2	15	0.13
<b>Total</b>	<b>182</b>	<b>232</b>	<b>0.78</b>

This table displays the A/E ratios for TRS 2/3 after we removed the data as described in the Data section.

TRS 2/3 Disability Counts by Age						
Age	Male			Female		
	Actual	Expected	Ratio	Actual	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	1	0.00	0	1	0.00
30-34	0	1	0.00	0	3	0.00
35-39	2	2	0.82	4	4	1.02
40-44	1	4	0.24	3	8	0.40
45-49	4	8	0.52	12	16	0.76
50-54	9	10	0.91	23	22	1.03
55-59	13	8	1.66	29	16	1.84
60-64	8	6	1.25	20	12	1.67
65+	0	0	0.00	0	0	0.00
<b>Total</b>	<b>37</b>	<b>41</b>	<b>0.91</b>	<b>91</b>	<b>82</b>	<b>1.12</b>

## Methods and Format of Assumptions

For the TRS plans, we considered the same alternatives and made the same relative changes as in PERS. Please see the **PERS – Methods and Format Assumptions** section for more information.

## Best Estimate TRS Disability Rates

The following table shows a sampling of the Old, Actual, and New disability rates for TRS 1.

TRS 1 Disability Rates						
Age	Old Rates		Actual Rates		New Rates	
	Male	Female	Male	Female	Male	Female
20	0.000013	0.000014	0.000000	0.000000	0.000013	0.000014
25	0.000091	0.000092	0.000000	0.000000	0.000091	0.000092
30	0.000187	0.000190	0.000000	0.000000	0.000187	0.000190
35	0.000321	0.000326	0.000000	0.000000	0.000321	0.000326
40	0.000428	0.000434	0.000000	0.000000	0.000428	0.000434
45	0.000944	0.000957	0.002182	0.000814	0.000944	0.000957
50	0.001634	0.001656	0.001674	0.001677	0.001634	0.001656
55	0.003347	0.003393	0.003895	0.001541	0.003347	0.003393
60	0.004686	0.004750	0.000000	0.000000	0.004686	0.004750
65	0.007213	0.007311	0.000000	0.000000	0.005633	0.005681
70	0.007213	0.007311	0.000000	0.000000	0.001485	0.001486
75	0.007213	0.007311	0.000000	0.000000	0.000391	0.000389
80	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

The following table shows a sampling of the Unchanged and Actual disability rates for TRS 2/3.

TRS 2/3 Disability Rates			
Unchanged Rates		Actual Rates	
Male	Female	Male	Female
0.000003	0.000003	0.000000	0.000000
0.000024	0.000019	0.000000	0.000000
0.000048	0.000040	0.000000	0.000000
0.000083	0.000068	0.000000	0.000000
0.000111	0.000091	0.000000	0.000000
0.000244	0.000201	0.000000	0.000160
0.000422	0.000347	0.000459	0.000176
0.001118	0.000750	0.002224	0.002138
0.002500	0.001875	0.004839	0.003207
0.002362	0.001552	0.000000	0.000000
0.000334	0.000283	0.000000	0.000000
0.000047	0.000052	0.000000	0.000000
0.000000	0.000000	0.000000	0.000000

The tables on this page show the Actual and Expected disabilities for TRS by age under both the old and new disability assumptions, as well as the Ratio of New Rates to Actual disabilities. As a reminder, we did not change the TRS 2/3 disability rates.

TRS 1 A/E Disability Counts								
Age	Male				Female			
	Actual	Expected		Ratio	Actual	Expected		Ratio
		Old Rates	New Rates			Old Rates	New Rates	
20-24	0	0	0	0.00	0	0	0	0.00
25-29	0	0	0	0.00	0	0	0	0.00
30-34	0	0	0	0.00	0	0	0	0.00
35-39	0	0	0	0.00	0	0	0	0.00
40-44	2	2	2	0.91	7	5	5	1.41
45-49	14	19	19	0.74	34	35	35	0.96
50-54	47	48	48	0.97	88	92	92	0.96
55-59	15	15	15	0.98	56	75	75	0.75
60-64	0	1	1	0.00	0	2	2	0.00
65+	0	0	0	0.00	0	0	0	0.00
<b>Total</b>	<b>78</b>	<b>86</b>	<b>86</b>	<b>0.91</b>	<b>185</b>	<b>209</b>	<b>209</b>	<b>0.89</b>

TRS 2/3 A/E Disability Counts						
Age	Male			Female		
	Actual	Expected	Ratio	Actual	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	1	0.00	0	1	0.00
30-34	0	1	0.00	0	3	0.00
35-39	2	2	0.82	4	4	1.02
40-44	1	4	0.24	3	8	0.40
45-49	4	8	0.52	12	16	0.76
50-54	9	10	0.91	23	22	1.03
55-59	13	8	1.66	29	16	1.84
60-64	8	6	1.25	20	12	1.67
65+	0	0	0.00	0	0	0.00
<b>Total</b>	<b>37</b>	<b>41</b>	<b>0.91</b>	<b>91</b>	<b>82</b>	<b>1.12</b>

## SERS 2/3

### Past Experience

We analyzed the data by looking at overall fit by year, as well as all data combined by plan, age, and gender to make slight adjustments to the School Employees' Retirement System (SERS) disability rates.

SERS Disability Counts by Year			
Males and Females			
Year	Actual	Expected	Ratio
1995	26	30	0.87
1996	36	32	1.13
1997	24	35	0.69
1998	32	38	0.84
1999	27	41	0.67
2000	13	39	0.33
2001	31	42	0.75
2002	34	44	0.78
2003	34	46	0.73
2004	42	48	0.88
2005	34	50	0.67
2006	30	53	0.56
2007	25	57	0.44
2008	18	59	0.30
2009	24	63	0.38
2010	27	66	0.41
2011	27	67	0.40
2012	16	66	0.24
<b>Total</b>	<b>500</b>	<b>877</b>	<b>0.57</b>

The table to the left shows the year-by-year Actual and Expected disabilities for SERS 2/3.

The table below shows the A/E ratios for SERS 2/3 after we removed the data as described in the Data section.

SERS 2/3 Disability Counts by Age						
Age	Male			Female		
	Actual	Expected	Ratio	Actual	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	0	0.00	0	0	0.00
30-34	0	0	0.00	3	2	1.41
35-39	2	2	1.17	3	10	0.31
40-44	1	6	0.18	8	11	0.74
45-49	9	12	0.74	27	27	0.99
50-54	21	24	0.89	38	73	0.52
55-59	37	42	0.87	71	77	0.92
60-64	53	62	0.85	41	60	0.68
65+	4	6	0.62	1	2	0.47
<b>Total</b>	<b>127</b>	<b>155</b>	<b>0.82</b>	<b>192</b>	<b>262</b>	<b>0.73</b>

### Methods and Format of Assumptions

For the SERS plans, we considered the same alternatives and made the same relative changes as in PERS. Please see the **PERS – Methods and Format Assumptions** section for more information.

### Best Estimate SERS Disability Rates

The following table shows a sampling of the Old, Actual, and New disability rates for the SERS Plans 2/3.

SERS Plans 2/3 Disability Rates						
Age	Old Rates		Actual Rates		New Rates	
	Male	Female	Male	Female	Male	Female
20	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
30	0.000000	0.000048	0.000000	0.000000	0.000000	0.000048
35	0.000081	0.000176	0.000000	0.000000	0.000081	0.000176
40	0.000258	0.000164	0.000000	0.000154	0.000258	0.000164
45	0.000568	0.000201	0.001510	0.000366	0.000528	0.000214
50	0.001102	0.000797	0.000649	0.000206	0.001213	0.000611
55	0.003175	0.002166	0.002889	0.001833	0.002787	0.001742
60	0.007200	0.005888	0.010222	0.002772	0.006404	0.004971
65	0.012600	0.004069	0.007937	0.005682	0.005928	0.004121
70	0.001260	0.001538	0.000000	0.000000	0.001271	0.001816
75	0.000126	0.000581	0.000000	0.000000	0.000272	0.000800
80	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

The table below shows the Actual and Expected disabilities for SERS 2/3 by age under both the old and new disability assumptions, as well as the Ratio of New Rates to actual disabilities.

SERS 2/3 A/E Disability Counts								
Age	Male				Female			
	Actual	Expected			Actual	Expected		
		Old Rates	New Rates	Ratio		Old Rates	New Rates	Ratio
20-24	0	0	0	0.00	0	0	0	0.00
25-29	0	0	0	0.00	0	0	0	0.00
30-34	0	0	0	0.00	3	2	2	1.41
35-39	2	2	2	1.17	3	10	10	0.31
40-44	1	6	6	0.18	8	11	11	0.74
45-49	9	12	12	0.73	27	27	27	0.99
50-54	21	24	25	0.85	38	73	57	0.66
55-59	37	42	37	0.99	71	77	63	1.12
60-64	53	62	53	0.99	41	60	56	0.73
65+	4	6	4	1.09	1	2	2	0.44
<b>Total</b>	<b>127</b>	<b>155</b>	<b>139</b>	<b>0.91</b>	<b>192</b>	<b>262</b>	<b>229</b>	<b>0.84</b>

## PSERS 2

### Past Experience

The Public Safety Employees' Retirement System (PSERS) opened in 2006 and did not have enough experience data to develop plan-specific assumptions in the prior study. For this study, PSERS experience continues to be limited. We used updated PERS disability rates to model disabilities when PSERS service is less than ten years.

PSERS Disability Counts by Year			
Plan 2			
Year	Actual	Expected	Ratio
2007	1	1	1.15
2008	0	1	0.00
2009	2	2	1.04
2010	1	2	0.43
2011	0	3	0.00
2012	2	3	0.68
<b>Total</b>	<b>6</b>	<b>12</b>	<b>0.47</b>

The table on the left shows the year-by-year Actual and Expected disabilities for PSERS, as well as the Ratio of A/E counts.

The table below shows the A/E ratios for PSERS after we removed the data as described in the Data section.

PSERS Disability Counts by Age						
Age	Male			Female		
	Actual	Expected	Ratio	Actual	Expected	Ratio
20-24	0	0	0.00	0	0	0.00
25-29	0	0	0.00	0	0	0.00
30-34	0	0	0.00	0	0	0.00
35-39	0	0	0.00	0	0	0.00
40-44	0	1	0.00	0	0	0.00
45-49	1	1	0.81	0	1	0.00
50-54	0	2	0.00	1	1	1.20
55-59	2	2	1.04	0	1	0.00
60-64	1	1	0.81	0	0	0.00
65+	0	0	0.00	0	0	0.00
<b>Total</b>	<b>4</b>	<b>8</b>	<b>0.50</b>	<b>1</b>	<b>3</b>	<b>0.33</b>

### Methods and Format of Assumptions

Whenever we consider changes to methods and formats of assumptions we must balance the desire for precision with the potential for increasing the complexity of the model. Based on the different plan provisions for PSERS, we made the following change.

- ◆ Increased disability rates for people with more than ten years of service because members with ten or more years of PSERS service receive benefits actuarially reduced from an earlier age. Without sufficient experience, we based the increased rates on future expectations only.

### Best Estimate PSERS Disability Rates

The table on this page shows a sampling of the Old, Actual, and New Rates for PSERS.

PSERS Disability Assumptions								
Age	Old Rates		Actual Rates		New Rates			
	Male	Female	Male	Female	Service < 10 Years		Service ≥ 10 Years	
					Male	Female	Male	Female
20	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25	0.000052	0.000000	0.000000	0.000000	0.000052	0.000000	0.000052	0.000000
30	0.000115	0.000056	0.000000	0.000000	0.000115	0.000056	0.000115	0.000056
35	0.000156	0.000194	0.000000	0.000000	0.000156	0.000194	0.000158	0.000197
40	0.000235	0.000275	0.000000	0.000000	0.000235	0.000275	0.000298	0.000348
45	0.000476	0.000467	0.000000	0.000000	0.000476	0.000467	0.000607	0.000596
50	0.000922	0.001003	0.000000	0.000000	0.000922	0.001003	0.001182	0.001285
55	0.002630	0.002782	0.005882	0.000000	0.002630	0.002782	0.003409	0.003606
60	0.007603	0.007681	0.000000	0.000000	0.007863	0.007681	0.000000	0.000000
65	0.010244	0.010271	0.000000	0.000000	0.006146	0.005257	0.000000	0.000000
70	0.010244	0.010271	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
75	0.010244	0.010271	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
80	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

This table shows the Actual and Expected disabilities for PSERS members, using rates for members with less than ten years of service, by age under both the old and new disability assumptions, as well as the Ratio of New Rates to Actual disabilities.

PSERS A/E Disability Counts								
Age	Male				Female			
	Actual	Expected		Ratio	Actual	Expected		Ratio
		Old Rates	New Rates (Service < 10)			Old Rates	New Rates (Service < 10)	
20-24	0	0	0	0.00	0	0	0	0.00
25-29	0	0	0	0.00	0	0	0	0.00
30-34	0	0	0	0.00	0	0	0	0.00
35-39	0	0	0	0.00	0	0	0	0.00
40-44	0	1	1	0.00	0	0	0	0.00
45-49	1	1	1	0.81	0	1	1	0.00
50-54	0	2	2	0.00	1	1	1	1.20
55-59	2	2	2	0.99	0	1	1	0.00
60-64	1	1	1	0.78	0	0	0	0.00
65+	0	0	0	0.00	0	0	0	0.00
<b>Total</b>	<b>4</b>	<b>8</b>	<b>8</b>	<b>0.50</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>0.33</b>

## LEOFF

### Past Experience

We analyzed the Law Enforcement Officers' and Fire Fighters' Retirement System (LEOFF) Plan 1 data by looking at overall fit by year, as well as all data combined by plan and age to see if we needed to make any adjustments to the disability rates. We did not change LEOFF 1 disability rates.

LEOFF 2 has a more complicated disability benefit structure than most public plans in Washington. Beginning in 2004, several disability benefit improvements were implemented for LEOFF 2. There are both duty-related and non-duty related benefits for this plan. Duty-related disabilities are further classified into occupational and total (or catastrophic) disabilities. Each of these disability classifications can result in a different benefit level. Therefore, we develop assumptions for all three types of disabilities. Please see the **LEOFF 2** section for more information about these assumptions.

We made adjustments to the assumption for all LEOFF 2 disabilities combined. We found that our duty-related disabilities assumption was a very close fit to the experience data and made only minor adjustments. We found that the assumed percent of duty-related disabilities that are also total (catastrophic) disabilities was a good fit and we did not change that assumption; it remains at 12 percent.

### LEOFF 1

The table below shows the year-by-year Actual and Expected disabilities for LEOFF 1, as well as the Ratio of A/E counts.

LEOFF 1 Disability Counts by Year			
(Males and Females)			
Year	Actual	Expected	Ratio
1995	157	177	0.89
1996	213	172	1.24
1997	154	161	0.96
1998	181	151	1.20
1999	130	137	0.95
2000	123	125	0.98
2001	93	111	0.83
2002	68	102	0.67
2003	57	92	0.62
2004	42	82	0.51
2005	18	72	0.25
2006	25	63	0.40
2007	10	53	0.19
2008	10	46	0.22
2009	4	38	0.10
2010	0	33	0.00
2011	0	28	0.00
2012	1	23	0.04
<b>Total</b>	<b>1,286</b>	<b>1,667</b>	<b>0.77</b>

LEOFF 1 Disability Counts by Age			
Male and Female			
Age	Actual	Expected	Ratio
20-24	0	0	0.00
25-29	0	0	0.00
30-34	0	0	0.00
35-39	1	2	0.40
40-44	75	60	1.25
45-49	303	362	0.84
50-54	545	592	0.92
55-59	228	364	0.63
60-64	30	111	0.27
65+	1	11	0.09
<b>Total</b>	<b>1,183</b>	<b>1,502</b>	<b>0.79</b>

The table to the left shows the A/E ratios for LEOFF 1 after we removed the data as described in the Data section.

LEOFF 2 All Disability Counts by Age			
Male and Female			
Age	Actual	Expected	Ratio
20-24	0	0	0.00
25-29	1	5	0.22
30-34	2	16	0.12
35-39	11	39	0.28
40-44	16	57	0.28
45-49	22	74	0.30
50-54	56	95	0.59
55-59	41	58	0.71
60-64	16	17	0.94
65+	1	3	0.39
<b>Total</b>	<b>166</b>	<b>364</b>	<b>0.46</b>

The table to the left shows the A/E ratios for all disabilities combined in LEOFF 2, after we removed the data as described in the Data section.

## LEOFF 2

LEOFF 2 Disability Counts by Year			
(Males and Females)			
Year	Actual	Expected	Ratio
2005	24	41	0.59
2006	31	44	0.71
2007	18	47	0.38
2008	26	50	0.52
2009	29	53	0.54
2010	23	56	0.41
2011	23	59	0.39
2012	10	61	0.16
<b>Total</b>	<b>184</b>	<b>411</b>	<b>0.45</b>

The table to the left shows the year-by-year Actual and Expected counts for all disabilities combined in LEOFF 2.

## Methods and Format of Assumptions

We considered alternate formats for the assumptions and, ultimately, decided not to make any changes. For reference, we considered, but did not adopt:

- ◆ **Separate rates by gender.**  
Since female members comprise a small minority of total LEOFF members we chose to keep rates gender-neutral.
- ◆ **Separate rates by occupation (police v. fire fighter).**  
The benefits are basically the same for both groups, and we felt that splitting an already-small system into separate occupation classifications would reduce the credibility of those separate rates.

### Best Estimate LEOFF Disability Rates

The table on the right shows a sampling of the Unchanged and Actual Rates for LEOFF 1.

LEOFF 1 Disability Rates		
Age	Unchanged Rates	Actual Rates
	Male & Female	Male & Female
20	0.001000	0.000000
25	0.001000	0.000000
30	0.007968	0.000000
35	0.014888	0.000000
40	0.023471	0.006579
45	0.040000	0.030928
50	0.070000	0.069284
55	0.090000	0.069973
60	0.100000	0.029730
65	0.100000	0.000000
70	0.000000	0.000000
75	0.000000	0.000000
80	0.000000	0.000000

The following table shows a sampling of the Old, Actual, and New Rates for all disabilities combined in LEOFF 2.

LEOFF 2 Disability Rates (All Disabilities Combined)			
Age	Old Rates	Actual Rates	New Rates
	Male & Female	Male & Female	Male & Female
20	0.000124	0.000000	0.000074
25	0.000319	0.000904	0.000191
30	0.000779	0.000361	0.000467
35	0.001345	0.000000	0.000807
40	0.002266	0.000210	0.001360
45	0.002994	0.000730	0.001796
50	0.005635	0.001461	0.003236
55	0.007955	0.002573	0.005534
60	0.010041	0.008696	0.009462
65	0.011769	0.000000	0.016180
70	0.000000	0.000000	0.000000
75	0.000000	0.000000	0.000000
80	0.000000	0.000000	0.000000

The table on the right shows the Actual and Expected combined disabilities for LEOFF 2 by age under both the old and new assumptions, as well as the Ratio of New Rates to Actual disabilities.

LEOFF 2 – Disability Experience (All Disabilities Combined) Male and Female				
Age	Actual	Expected		Ratio
		Old Rates	New Rates	
20-24	0	0	0	0.00
25-29	1	5	3	0.37
30-34	2	16	10	0.21
35-39	11	39	24	0.47
40-44	16	57	34	0.47
45-49	22	74	44	0.50
50-54	56	95	58	0.96
55-59	41	58	44	0.93
60-64	16	17	18	0.90
65+	1	3	2	0.62
<b>Total</b>	<b>166</b>	<b>364</b>	<b>237</b>	<b>0.70</b>

The table below shows the actual and expected duty disabilities for LEOFF 2 by age under both the old and new assumptions, as well as the Ratio of New Rates to Actual duty-related disabilities.

LEOFF 2 Duty Disability Experience 2005-2012				
Age	Actual	Expected		Ratio
		Old Rates	New Rates	
20-24	0	0	0	0.00
25-29	1	1	1	1.04
30-34	2	2	2	1.06
35-39	11	10	10	1.08
40-44	15	14	14	1.03
45-49	19	19	19	0.99
50-54	43	47	48	0.90
55-59	30	34	34	0.88
60-64	13	13	13	0.97
65+	1	1	1	1.20
<b>Total</b>	<b>135</b>	<b>142</b>	<b>143</b>	<b>0.95</b>

The table to the right shows a sampling of the Old, Actual, and New percent duty disabilities in LEOFF 2.

LEOFF 2 – Percent of Disabilities that are Duty Related			
Age	Old Rates	Actual	New Rates
20	97.15%	0.00%	97.25%
25	95.71%	100.00%	95.86%
30	94.30%	100.00%	94.50%
35	92.85%	0.00%	93.11%
40	91.45%	100.00%	91.75%
45	88.60%	100.00%	89.00%
50	85.75%	80.00%	86.25%
55	82.90%	40.00%	83.50%
60	82.90%	80.00%	83.50%
65	82.90%	0.00%	83.50%
70	82.90%	0.00%	83.50%

LEOFF 2 Total (Catastrophic) Disability			
Male and Female			
Age	Actual	Expected	Ratio
20-24	0	0	0.00
25-29	0	0	0.00
30-34	0	0	0.00
35-39	1	1	0.76
40-44	2	2	1.11
45-49	4	2	1.75
50-54	5	5	0.97
55-59	6	4	1.67
60-64	0	2	0.00
65+	0	0	0.00
<b>Total</b>	<b>18</b>	<b>16</b>	<b>1.11</b>

The table to the left shows the Actual and Expected total (catastrophic) disabilities over the period studied. The data proved to be a good fit to the assumption, so we left it unchanged at 12 percent. In other words, we expect 12 percent of all duty-related disabilities to be classified as total disabilities.

## WSPRS

### Past Experience

We analyzed the data by looking at overall fit by year, as well as all data combined by plan and age to make adjustments to the Washington State Patrol Retirement System (WSPRS) disability rates.

The table to the right shows the year-by-year Actual and Expected disabilities for WSPRS 1/2, as well as the Ratio of A/E counts.

WSPRS 1/2 Disability Counts by Year			
(Males and Females)			
Year	Actual	Expected	Ratio
1995	4	1	4.31
1996	3	1	3.42
1997	1	1	1.15
1998	1	1	1.13
1999	1	1	1.11
2000	0	1	0.00
2001	0	1	0.00
2002	1	1	1.02
2003	0	1	0.00
2004	1	1	0.96
2005	0	1	0.00
2006	0	1	0.00
2007	1	1	0.95
2008	0	1	0.00
2009	0	1	0.00
2010	1	1	0.84
2011	0	1	0.00
2012	0	1	0.00
<b>Total</b>	<b>14</b>	<b>18</b>	<b>0.76</b>

The table on the right shows the A/E ratios for WSPRS 1/2 by age after we removed the data as described in the Data section.

WSPRS Plan 1/2 Disability Counts by Age			
Males and Females			
Age	Actual	Expected	Ratio
20-24	0	0	0.00
25-29	1	1	1.41
30-34	1	2	0.59
35-39	0	3	0.00
40-44	2	3	0.63
45-49	4	4	1.13
50-54	1	2	0.41
55-59	0	1	0.00
60-64	0	0	0.00
65+	0	0	0.00
<b>Total</b>	<b>9</b>	<b>15</b>	<b>0.58</b>

### Best Estimate WSPRS Disability Rates

The following table shows a sampling of the Old, Actual, and New Rates for WSPRS 1/2.

WSPRS 1/2 Disability Rates			
Age	Old Rates	Actual Rates	New Rates
	Male & Female	Male & Female	Male & Female
20	0.000256	0.000000	0.000052
25	0.000353	0.000000	0.000094
30	0.000488	0.000000	0.000169
35	0.000675	0.000000	0.000306
40	0.000933	0.000000	0.000551
45	0.001290	0.001869	0.000995
50	0.001783	0.000000	0.001794
55	0.002465	0.000000	0.003237
60	0.003408	0.000000	0.000560
65	0.000000	0.000000	0.000000
70	0.000000	0.000000	0.000000
75	0.000000	0.000000	0.000000
80	0.000000	0.000000	0.000000

### Methods and Format of Assumptions

We considered alternate formats for the assumptions, and ultimately decided not to make any changes. For reference, we considered, but did not adopt:

◆ **Separate rates by gender.**

Because female members comprise a small minority of total members for those systems we chose to keep rates gender-neutral.

◆ **Separate rates by plan.**

At this time, Plan 2 does not have enough experience data with which to develop a credible rate.

The table below shows the actual and expected disabilities for WSPRS 1/2 by age under both the Old and New disability assumptions, as well as the Ratio of New Rates to actual disabilities.

WSPRS 1/2 A/E Disability Counts				
Males and Females				
Age	Actual	Expected		Ratio
		Old Rates	New Rates	
20-24	0	0	0	0.00
25-29	1	1	0	4.62
30-34	1	2	1	1.50
35-39	0	3	1	0.00
40-44	2	3	2	0.95
45-49	4	4	3	1.32
50-54	1	2	3	0.37
55-59	0	1	1	0.00
60-64	0	0	0	0.00
65+	0	0	0	0.00
<b>Total</b>	<b>9</b>	<b>15</b>	<b>11</b>	<b>0.82</b>