

THREE: APPENDICES

DISABILITY RATES

Methodology

The disability rates assumption represents the combination of our expected probability of disablement and the selection of a disabled retirement benefit by service retirement ineligible members. We define this rate as the disability rate or the rate of disablement. We compared the actual rate of disablements against what we expected to determine the accuracy of our disablement rate assumptions over the study period. For each year and retirement plan, we counted the number of members who did not meet the service retirement eligibility requirements at the beginning of the year (exposures). We also counted the number of members who disabled, were not service retirement eligible, and started receiving disability retirement benefits during the year (disablements). We then divided the number of disablements by the number of exposures to arrive at the actual rates of disablement. We compared the actual rate to expected rate of disablement over the full period and on an annual basis. This helped us identify trends in the data where our assumption differed from what actually happened.

We developed new disability rate assumptions by adjusting the old assumptions to more closely reflect historical experience. We analyzed the relationship between actual to expected disability rates in light of economic and demographic trends and applied our professional judgment to set new assumptions. In most cases, we did not develop a new assumption to perfectly replicate the study period. We targeted a smaller move than the study experience would indicate to account for future experience not exactly matching the past and the relatively few number of observations in this decrement. We also considered various plan combinations and different assumption formats. For example, we considered combing Plans 2 and 3 in PERS, TRS, and SERS, and considered combing LEOFF Plan 2 and WSPRS. We also considered gender-specific rates and splitting LEOFF Plan 2 by profession, law enforcement officers and firefighters. Ultimately, we do not believe those combinations or different assumption formats offer a significant increase above the old assumption formats in the modeling accuracy.

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Analysis

We divided our analysis into the following two sections:

Review of Historical Data: Relying on historical data to set forward-looking disablement assumptions requires us to consider if that historical experience will be a good indicator of the future. In other words, we considered whether or not past experience might represent non-typical disablement experience and if we should exclude that experience from the study. In this assessment, we considered data from 1995-2017 to include in the study.

Review of Key Demographic Factors: With the historical data period selected, we considered population demographics that could influence disablement behavior. Some of the demographics we studied included gender and retirement plan selection. With consideration for the credibility of our experience data and the key components of a specific population, we determined group-specific rates. In certain cases, we considered changing our old assumption format by subdividing groups by gender or job classification, but we determined that this approach both detracted from the credibility of the data used to develop the assumption and did not significantly impact the results.

To review the historical data and demographic factors, we compared the actual number of disablements to our old expectation. We calculated an A/E ratio to help us determine trends in the data. An A/E ratio of less than 1.00 generally indicates members are experiencing a disability and selecting a disabled retirement benefit later or at lower rates than the old assumption projects. While an A/E ratio of greater than 1.00 tells us members are experiencing a disability and selecting a disabled retirement benefit earlier or at higher rates than we assume. In general, we developed a new assumption so that the A/E ratio moved closer to 1.00. Please see the **Exhibits** section for a comparison of A/E ratio between the old and new assumptions for each system.

The following sections summarize our observations of the review of historical data and key demographic factors:

Review of Historical Data

We looked at different periods of data to determine how the systems have changed over time and what data we would include in the study. As noted in the **Summary** section, we excluded data for 2001 and 2007 because the valuation date changed in those years.

Plans 1: PERS, TRS, LEOFF

PERS, TRS, and LEOFF Plan 1 show a trend of decreasing A/E ratios moving from 1995 toward 2017. In recent years, we see very few, if any, disabled retirements. We're also observing fewer Plan 1 members not eligible for retirement. Over the 2017 study period year, there were 291 PERS 1 and 9 TRS 1 active members not eligible for retirement, and 58 LEOFF 1 members in total. We believe these members will likely act more like recently disabled retirees than historical disability retirees. We further believe all remaining active members are very likely to select a service retirement benefit if they experience a disability in the future. With this in mind and in expectation of future experience, we removed disability rates for each of these plans.

Plan 1 Retirement Experience by Year									
Year	PERS 1			TRS 1			LEOFF 1		
	Actual	Expected	A/E	Actual	Expected	A/E	Actual	Expected	A/E
1995-2012*	881	954	0.92	265	292	0.91	1,183	1,518	0.78
2013-2017	14	22	0.63	1	1	0.78	0	51	0
Total	895	976	0.92	266	294	0.91	1,183	1,569	0.75

*Does not include data from 2001 and 2007 because of changing valuation date.

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Plans 2/3: PERS, TRS, SERS

In addition to excluding 2001 and 2007 data from the study, we also removed 2000 data from SERS. The Legislature created SERS in the year 2000 for school employees that were previously members of PERS. This year of data shows a large dip in the number of SERS actual disabled retirements, which we believe is an outlier. We were able to gather SERS data prior to 2000 by selectively pulling data for PERS members employed at school districts that would have been eligible for SERS.

The prior experience study ([2007-2012 Demographic Experience Study](#)) used data from 1995-2006 to set assumptions for the Plans 2/3. We removed the 2008-2012 data from the prior study because of the large impact the Great Recession appeared to have on disabled retirement selection behavior. In order to include this data, we needed additional experience to show either the system's recovery from the recession or a continuation of the lower trend set during the recession. As of the current study ([2013-2018 Demographic Experience Study](#)), this data is now available and indicates the latter. The data shows the continuation of a lower disabled retirement selection rate through 2013-2017. Including the Great Recession data, the experience from 2008-2017 accounts for approximately 40 percent of the observed disabled retirements over the entire study period. This demonstrates a lower trend in the more recent years and supports lower assumed rates of disablement.

Experience between PERS, TRS and SERS appeared consistent; however, experience between plans did not. Plan 2 experience consistently showed a higher rate of disabled retirement than Plan 3. We set Plan 2 rates on combined experiences of PERS, TRS, and SERS Plans 2, and applied a scaling factor of 40 percent to these rates to produce Plan 3 disability rates. We believe Plan 3 members generally follow this pattern because they can elect to retire from the defined contribution portion of the plan and defer commencement of their defined benefit. However, we don't have sufficient data to set experienced-based rates in Plan 3. To set separate Plan 3 rates at 40 percent of Plan 2 rates, we applied our professional judgment to reflect lower rates of selection of the immediate disability retirement benefit than Plan 2.

To conclude, we observed a trend of decreasing A/E ratios when comparing the 1995-2006 period to the 2008-2012 and 2013-2017 periods for the Plans 2/3, most prominently in PERS. We saw a consistent trend of fewer disabled retirements than expected since 2008. With this in mind, we chose to set an assumption using data from 1995-2017 to address the observed trend.

Plan 2 Retirement Experience by Year									
Year	PERS			TRS			SERS		
	Actual	Expected	A/E	Actual	Expected	A/E	Actual	Expected	A/E
1995-2006*	1,320	1,329	0.99	82	54	1.51	275	284	0.97
2008-2012	543	870	0.62	17	22	0.76	101	139	0.73
2013-2017	344	851	0.40	6	21	0.29	55	164	0.34
Total	2,207	3,050	0.72	105	98	1.08	431	587	0.73

*Does not include data from 2001 and 2007 because of changing valuation date. SERS 2 analysis also excludes the plan creation year 2000.

Plan 3 Retirement Experience by Year									
Year	PERS			TRS			SERS		
	Actual	Expected	A/E	Actual	Expected	A/E	Actual	Expected	A/E
1995-2006*	48	56	0.86	46	66	0.69	42	89	0.47
2008-2012	37	111	0.33	19	58	0.32	35	136	0.26
2013-2017	20	130	0.15	13	51	0.25	29	118	0.24
Total	105	296	0.35	78	176	0.44	106	344	0.31

*Does not include data from 2001 and 2007 because of changing valuation date. SERS 3 analysis also excludes the plan creation year 2000.

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Public Safety Plans: LEOFF 2, WSPRS 1/2, PSERS 2

The prior experience study used data from 2005-2012 to set assumptions for LEOFF 2, and from 1995-2012 to set assumptions for WSPRS 1/2. Unlike Plans 2/3, we did not exclude 2008-2012 because we did not observe a change in disabled retirement selection resulting from the Great Recession. The following table summarizes how the retirement behavior has changed since the prior experience study.

Public Safety Retirement Experience by Year									
Year	LEOFF 2			WSPRS 1/2			PSERS 2		
	Actual	Expected	A/E	Actual	Expected	A/E	Actual	Expected	A/E
1995-2006*	55	54	1.03	12	7	1.61	0	0	N/A
2008-2012	128	179	0.72	1	4	0.24	6	11	0.56
2013-2017	143	217	0.66	0	4	0.00	9	20	0.45
Total	326	449	0.73	13	16	0.81	15	31	0.49

In LEOFF 2, we observed fewer disabled retirements than expected but at a relatively similar rate to that of the prior study. Conversely, in WSPRS we observed both fewer disabled retirements than expected and at a far lower rate than the prior study.

PSERS 2 opened July 1, 2006 and provided the option for eligible PERS 2/3 members to move into the new system. PSERS experienced 15 disabled retirements during the study period. This experience represents insufficient data to set standalone PSERS disability rates. Instead, we relied on the combined PERS, TRS, and SERS 2 rates to help inform our PSERS 2 disability rates assumption and made subsequent adjustments to reflect differences in plan designs between the systems. We will continue to monitor the appropriateness of the PSERS 2 disability rates going forward and will make any necessary adjustments when needed.

Review of Key Demographic Factors

1. PERS, TRS, and LEOFF Plans 1 Active Members

The remaining Plan 1 active members are generally older than members of past studies and nearly all eligible for service retirement. Considering recent disability experience, of which there is little, we removed all PERS, TRS, and LEOFF Plan 1 rates. We believe few remaining members in any of these plans will both experience a disabling incident and choose a disabled retirement benefit.

2. Male Versus Female Disability Experience

We previously assumed gender-specific disability rates for all plans in PERS, TRS, SERS, and PSERS. The prior experience study had shown a trend of females typically disabling at a lower rate than males.

Plans 2/3: PERS, TRS, SERS

The new Plan 2/3 data indicated the difference in male and female rates is generally similar over the time periods from 1995-2007, and from 2008-2017. We see the largest difference between male and female disabled retirement rates in SERS 2/3. However, that difference decreases when we include 2008-2017.

Plan 2 Disability Rates by Gender									
Year	PERS			TRS			SERS		
	Male	Female	Difference	Male	Female	Difference	Male	Female	Difference
1995-2007*	0.0011	0.0010	0.0001	0.0005	0.0005	0.0000	0.0017	0.0007	0.0010
2008-2017	0.0010	0.0008	0.0002	0.0002	0.0002	0.0000	0.0014	0.0007	0.0008

**Does not include data from 2001 and 2007 because of changing valuation date. SERS 2 analysis also excludes the plan creation year 2000.*

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Plan 3 Disability Rates by Gender									
Year	PERS			TRS			SERS		
	Male	Female	Difference	Male	Female	Difference	Male	Female	Difference
1995-2007*	0.0005	0.0006	(0.0001)	0.0001	0.0001	0.0000	0.0005	0.0003	0.0002
2008-2017	0.0003	0.0002	0.0001	0.0001	0.0001	0.0000	0.0004	0.0002	0.0001

*Does not include data from 2001 and 2007 because of changing valuation date. SERS 3 analysis also excludes the plan creation year 2000.

In the future, we expect males and females to have similar incidences of disablement and selection, so we combined male and female data to set a gender-neutral set of disability rates.

Public Safety Plans: LEOFF 2, WSPRS 1/2, PSERS 2

We maintained the single set of gender-neutral retirement rates in LEOFF 2 and WSPRS 1/2 because of the heavy population weighting of the systems toward males. At this time, we do not have sufficient data to set gender-specific rates. We also created gender-neutral rates for PSERS 2 for consistency with PERS, TRS, and SERS 2/3 rates.

3. Plan 2 Versus Plan 3 Disability Experience

We studied retirement experience for Plan 2 and Plan 3 individually. The plans have fundamental differences in design, which we expected would lead to different disabled retirement selection behavior. Plan 2 is a defined benefit plan, while Plan 3 is a hybrid of defined benefit and defined contribution. In prior studies, we had observed a difference in rates by plan, but lacked sufficient experience to set credible plan-specific rates. While we do observe a difference between Plans 2 and 3, we continue to lack experience to set plan-specific assumptions. However, in our opinion, the plan design difference and the observed experience are sufficient to set plan-specific rates. To set Plan 3 rates, we relied on Plan 2 data and applied an adjustment factor.

The following table displays the disability experience between Plans 2 and 3.

Plan 2 vs. Plan 3 Disability Experience (1995-2017)*									
Year	PERS			TRS			SERS		
	Actual	Expected	A/E	Actual	Expected	A/E	Actual	Expected	A/E
Plan 2	2,207	3,050	0.72	105	98	1.08	431	587	0.73
Plan 3	105	296	0.35	78	176	0.44	106	344	0.31
Total	2,312	3,346	0.69	183	274	0.67	537	931	0.58

*Does not include data from 2001 and 2007 because of changing valuation date. SERS 2/3 analysis also excludes the plan creation year 2000.

We observed lower Plan 3 disabled retirement selection rates than Plan 2 for all three systems. This trend also persists across almost every year of data in the study period. One reason may be due to the Plan 3 hybrid design which may prompt members to withdraw their DC contributions upon disablement and defer the DB portion of their benefit. However, as noted, we lack experience to set Plan 3 assumptions based solely on Plan 3 data, so we used Plan 2 data and applied an adjustment to set the assumptions for Plan 3.

4. LEOFF 2 Law Enforcement Officer and Firefighter Disability Experience

Experience indicates differences between disabled retirements of law enforcement officers and firefighters may exist. Law enforcement officers experience disabilities and select disabled retirements at a slightly higher rate than firefighters, averaging approximately 20 percent more disablements per year over the study period. We considered separate rates for each group, but ultimately decided blended disability assumptions remain reasonable and provide, in our opinion, sufficient accuracy without further complicating the model.

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Rate of Disablement by Profession	
	LEOFF 2
Law Enforcement Officer	0.0017
Fire Fighter	0.0015

Note: Rates calculated over the study period 2005-2017, excluding 2007.

Average Number of Disabilities Per Year by Profession		
	LEOFF 2	Percent of Active Members
Law Enforcement Officer	15.50	0.17%
Fire Fighter	11.67	0.14%

Notes: Average Number of Disabilities for the study period 2005-2017, excluding 2007. Percent of active membership as of June, 30 2017.

New Assumptions

For all old and new assumptions, note that rates are shown in five-year increments consistent with the format of the new assumptions. For old assumptions, rates are not shown between these five-year increments but can generally be interpolated.

Plans 1: PERS, TRS, LEOFF

We believe recent plan experience is a good indicator for future disabled retirement selection. Members in these systems are all near, or at, retirement eligibility so we expect few, if any, to select disabled retirement. We applied our professional judgment and no longer apply assumed disability rates to these plans. Please see the individual system tables in the **Exhibits** section for a comparison between the new, old, and actual rates.

Plans 2/3: PERS, TRS, SERS

We assume Plan 2 members will have similar experience across PERS, TRS, and SERS. Likewise, we assume Plan 3 members will have similar experience across these three retirement systems. We combined male and female experience across plans and systems to develop a single set of rates, by plan. We believe experience for any one system was too limited to set a gender-specific assumption, but that experience also showed a significant selection difference between plans. Please see the individual system tables in the **Exhibits** section for a comparison between the new, old, and actual rates.

Public Safety Plans: LEOFF 2, WSPRS 1/2, PSERS 2

We assume member disabled retirement selection differs between each plan. Disability provisions and benefits, as well as plan demographics, vary amongst each plan. For each plan, we combined male and female experience to develop our new assumed rates. We set LEOFF 2 rates on plan experience and simplified WSPRS rates given the small number of observed disablements in this relatively small plan. In PSERS 2, disability benefits differ once members earn 10 years of service credit. We also believe the plan demographics are similar to that of non-public safety plans like PERS. We have very limited experience and few disabled retirement observations, so we relied on PERS, TRS, and SERS Plan 2 rates to set our assumption for members with less than 10 years of service. For PSERS members with over ten years of service, we applied professional judgment and increased rates to account for the increase in benefits a member could receive upon attaining this service level. Please see the individual system tables in the **Exhibits** section for a comparison between the new, old, and actual rates.

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Exhibits

Actual to Expected Disabled Retirements

PERS, TRS, and LEOFF Plans 1

PERS Plan 1 Disability Counts by Year			
<i>(Males and Females)</i>			
Year	Actual	Expected	Ratio
1995	108	99	1.09
1996	86	98	0.88
1997	83	96	0.87
1998	101	92	1.10
1999	95	87	1.09
2000	71	82	0.87
2001	68	76	0.89
2002	63	69	0.91
2003	69	62	1.11
2004	60	57	1.05
2005	40	51	0.78
2006	34	45	0.75
2007	13	39	0.33
2008	17	33	0.51
2009	19	28	0.68
2010	16	22	0.72
2011	16	18	0.90
2012	3	13	0.23
2013	7	9	0.79
2014	1	6	0.17
2015	5	4	1.31
2016	1	2	0.44
2017	0	1	0.00
Total	976	1,092	0.89

PERS Plan 1 Disability Counts by Age			
<i>(Males and Females)</i>			
Age	Actual	Expected	Ratio
20-24	0	0	0.00
25-29	0	0	0.00
30-34	0	0	0.00
35-39	0	0	0.00
40-44	0	0	0.00
45-49	0	0	0.00
50-54	0	1	0.00
55-59	14	20	0.71
60-64	0	2	0.00
65+	0	0	0.00
Total	14	22	0.63

Note: By age A/E ratios reflect a 2013-2017 study period.

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Actual to Expected Disabled Retirements

PERS, TRS, and LEOFF Plans 1 *(continued)*

TRS Plan 1 Disability Counts by Year			
<i>(Males and Females)</i>			
Year	Actual	Expected	Ratio
1995	37	33	1.13
1996	31	33	0.94
1997	32	32	0.99
1998	37	32	1.15
1999	30	31	0.98
2000	19	29	0.65
2001	38	26	1.46
2002	20	23	0.87
2003	21	20	1.05
2004	11	17	0.65
2005	10	14	0.72
2006	8	11	0.71
2007	5	9	0.59
2008	3	6	0.49
2009	2	5	0.44
2010	2	3	0.62
2011	2	2	0.93
2012	0	1	0.00
2013	0	1	0.00
2014	1	0	3.05
2015	0	0	0.00
2016	0	0	0.00
2017	0	0	0.00
Total	309	328	0.94

TRS Plan 1 Disability Counts by Age			
<i>(Males and Females)</i>			
Age	Actual	Expected	Ratio
20-24	0	0	0.00
25-29	0	0	0.00
30-34	0	0	0.00
35-39	0	0	0.00
40-44	0	0	0.00
45-49	0	0	0.00
50-54	0	0	0.00
55-59	1	1	0.98
60-64	0	0	0.00
65+	0	0	0.00
Total	1	1	0.78

Note: By age A/E ratios reflect a 2013-2017 study period.

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Actual to Expected Disabled Retirements

PERS, TRS, and LEOFF Plans 1 (*continued*)

LEOFF Plan 1 Disability Counts by Year			
<i>(Males and Females)</i>			
Year	Actual	Expected	Ratio
1995	157	181	0.87
1996	213	175	1.22
1997	154	164	0.94
1998	181	153	1.18
1999	130	139	0.94
2000	123	127	0.97
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	32	0.00
2011	0	28	0.00
2012	1	23	0.04
2013	0	17	0.00
2014	0	13	0.00
2015	0	10	0.00
2016	0	7	0.00
2017	0	4	0.00
Total	1,286	1,733	0.74

LEOFF Plan 1 Disability Counts by Age			
<i>(Males and Females)</i>			
Age	Actual	Expected	Ratio
20-24	0	0	0.00
25-29	0	0	0.00
30-34	0	0	0.00
35-39	0	0	0.00
40-44	0	0	0.00
45-49	0	0	0.00
50-54	0	0	0.00
55-59	0	13	0.00
60-64	0	28	0.00
65+	0	10	0.00
Total	0	51	0.00

Note: By age A/E ratios reflect a 2013-2017 study period.

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Actual to Expected Disabled Retirements

PERS, TRS, and SERS Plans 2 and Plans 3

PERS, TRS, and SERS Plans 2 Disability Counts by Year			
<i>(Males and Females)</i>			
Year	Actual	Expected	Ratio
1995	91	118	0.77
1996	128	128	1.00
1997	105	139	0.75
1998	150	146	1.03
1999	166	155	1.07
2000	142	152	0.93
2001	154	156	0.99
2002	179	156	1.15
2003	175	164	1.07
2004	195	171	1.14
2005	186	179	1.04
2006	173	185	0.93
2007	133	187	0.71
2008	133	197	0.68
2009	124	206	0.60
2010	136	211	0.65
2011	150	210	0.71
2012	118	207	0.57
2013	109	204	0.53
2014	90	205	0.44
2015	86	207	0.42
2016	74	209	0.35
2017	46	212	0.22
Total	3,043	4,103	0.74

PERS, TRS, and SERS Plans 2 Disability Counts by Age			
<i>(Males and Females)</i>			
Age	Actual	Expected	Ratio
20-24	0	0	0.00
25-29	4	8	0.49
30-34	10	33	0.31
35-39	45	80	0.56
40-44	88	136	0.65
45-49	264	301	0.88
50-54	510	647	0.79
55-59	850	1,109	0.77
60-64	948	1,383	0.69
65+	24	37	0.65
Total	2,743	3,734	0.73

Note: By age A/E ratios reflect a 1995-2017 study period, excluding 2001 and 2007 for PERS, TRS, and SERS, and 2000 in SERS.

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Actual to Expected Disabled Retirements

PERS, TRS, and SERS Plans 2 and Plans 3 (*continued*)

PERS, TRS, and SERS Plans 3 Disability Counts by Year			
<i>(Males and Females)</i>			
Year	Actual	Expected	Ratio
1995	0	0	0.00
1996	0	0	0.00
1997	0	0	0.00
1998	2	5	0.43
1999	3	6	0.54
2000	3	16	0.19
2001	11	19	0.57
2002	25	30	0.83
2003	17	34	0.50
2004	32	38	0.83
2005	24	43	0.55
2006	30	48	0.62
2007	15	52	0.29
2008	15	57	0.27
2009	15	60	0.25
2010	24	63	0.38
2011	22	63	0.35
2012	15	63	0.24
2013	17	61	0.28
2014	18	60	0.30
2015	13	60	0.22
2016	6	59	0.10
2017	8	59	0.14
Total	315	897	0.35

PERS, TRS, and SERS Plans 3 Disability Counts by Age			
<i>(Males and Females)</i>			
Age	Actual	Expected	Ratio
20-24	0	0	0.00
25-29	0	4	0.00
30-34	4	14	0.29
35-39	3	28	0.11
40-44	17	46	0.37
45-49	59	106	0.56
50-54	131	235	0.56
55-59	36	173	0.21
60-64	33	194	0.17
65+	6	17	0.35
Total	289	816	0.35

Note: By age A/E ratios reflect a 1995-2017 study period, excluding 2001 and 2007 for PERS, TRS, and SERS, and 2000 in SERS.

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Actual to Expected Disabled Retirements

Public Safety Plans: LEOFF 2, WSPRS 1/2, PSERS 2

LEOFF Plan 2 Disability Counts by Year			
<i>(Males and Females)</i>			
Year	Actual	Expected	Ratio
1995	0	10	0.00
1996	2	11	0.18
1997	0	13	0.00
1998	1	14	0.07
1999	2	15	0.13
2000	13	17	0.77
2001	3	18	0.17
2002	13	20	0.66
2003	6	22	0.28
2004	18	24	0.75
2005	24	26	0.93
2006	31	28	1.12
2007	18	29	0.62
2008	26	31	0.83
2009	30	34	0.89
2010	24	36	0.67
2011	25	38	0.66
2012	23	40	0.58
2013	39	41	0.95
2014	25	42	0.59
2015	27	43	0.62
2016	26	45	0.58
2017	26	45	0.57
Total	402	641	0.63

LEOFF Plan 2 Disability Counts by Age			
<i>(Males and Females)</i>			
Age	Actual	Expected	Ratio
20-24	0	0	0.00
25-29	1	4	0.23
30-34	4	16	0.25
35-39	19	37	0.51
40-44	38	59	0.65
45-49	46	81	0.57
50-54	106	109	0.97
55-59	83	93	0.89
60-64	27	45	0.59
65+	2	4	0.48
Total	326	449	0.73

Note: By age A/E ratios reflect a 2005-2017 study period, excluding 2007.

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Actual to Expected Disabled Retirements

Public Safety Plans: LEOFF 2, WSPRS 1/2, PSERS 2 (*continued*)

WSPRS Plans 1/2 Disability Counts by Year			
<i>(Males and Females)</i>			
Year	Actual	Expected	Ratio
1995	4	1	5.71
1996	3	1	4.60
1997	1	1	1.57
1998	1	1	1.52
1999	1	1	1.50
2000	0	1	0.00
2001	0	1	0.00
2002	1	1	1.47
2003	0	1	0.00
2004	1	1	1.40
2005	0	1	0.00
2006	0	1	0.00
2007	1	1	1.41
2008	0	1	0.00
2009	0	1	0.00
2010	1	1	1.18
2011	0	1	0.00
2012	0	1	0.00
2013	0	1	0.00
2014	0	1	0.00
2015	0	1	0.00
2016	0	1	0.00
2017	0	1	0.00
Total	14	17	0.81

WSPRS 1/2 Disability Counts by Age			
<i>(Males and Females)</i>			
Age	Actual	Expected	Ratio
20-24	0	0	0.00
25-29	1	0	3.29
30-34	1	1	1.16
35-39	0	2	0.00
40-44	2	3	0.68
45-49	4	5	0.86
50-54	5	4	1.20
55-59	0	1	0.00
60-64	0	0	0.00
65+	0	0	0.00
Total	13	16	0.81

Note: By age A/E ratios reflect a 1995-2017 study period, excluding 2001 and 2007.

THREE: APPENDICES

DISABILITY RATES

continued

Actual to Expected Disabled Retirements

Public Safety Plans: LEOFF 2, WSPRS 1/2, PSERS 2 (*continued*)

PSERS Plan 2 Disability Counts by Year			
<i>(Males and Females)</i>			
Year	Actual	Expected	Ratio
1995	0	0	0.00
1996	0	0	0.00
1997	0	0	0.00
1998	0	0	0.00
1999	0	0	0.00
2000	0	0	0.00
2001	0	0	0.00
2002	0	0	0.00
2003	0	1	0.00
2004	0	1	0.00
2005	0	1	0.00
2006	0	1	0.00
2007	1	1	1.19
2008	0	1	0.00
2009	2	2	1.08
2010	1	2	0.45
2011	0	3	0.00
2012	3	3	1.05
2013	1	3	0.31
2014	1	4	0.28
2015	0	4	0.00
2016	3	5	0.63
2017	4	4	0.93
Total	16	37	0.44

PSERS Plan 2 Disability Counts by Age			
<i>(Males and Females)</i>			
Age	Actual	Expected	Ratio
20-24	0	0	0.00
25-29	0	1	0.00
30-34	0	1	0.00
35-39	0	2	0.00
40-44	0	3	0.00
45-49	3	5	0.59
50-54	4	7	0.58
55-59	4	10	0.39
60-64	4	6	0.70
65+	0	0	0.00
Total	15	35	0.42

Note: By age A/E ratios reflect a 2008-2017 study period.

THREE: APPENDICES

DISABILITY RATES

continued

Actual, Old, and New Disabled Retirement Rates

PERS

PERS Plan 1 Disability Rates					
Age	Actual		Old		New
	Male	Female	Male	Female	Male/Female
20-24	0.0000	0.0000	0.0000	0.0000	0.0000
25-29	0.0000	0.0000	0.0000	0.0000	0.0000
30-34	0.0000	0.0000	0.0000	0.0000	0.0000
35-39	0.0000	0.0000	0.0004	0.0005	0.0000
40-44	0.0000	0.0000	0.0010	0.0011	0.0000
45-49	0.0000	0.0000	0.0019	0.0018	0.0000
50-54	0.0000	0.0000	0.0039	0.0042	0.0000
55-59	0.0017	0.0066	0.0103	0.0070	0.0000
60-64	0.0000	0.0000	0.0049	0.0017	0.0000
65-69	0.0000	0.0000	0.0014	0.0002	0.0000
70-74	0.0000	0.0000	0.0004	0.0000	0.0000
75-79	0.0000	0.0000	0.0001	0.0000	0.0000
80	0.0000	0.0000	0.0000	0.0000	0.0000

PERS Plan 2 Disability Rates					
Age	Actual		Old		New
	Male	Female	Male	Female	Male/Female
20-24	0.0000	0.0000	0.0000	0.0000	0.0000
25-29	0.0000	0.0000	0.0001	0.0000	0.0001
30-34	0.0000	0.0000	0.0001	0.0001	0.0001
35-39	0.0001	0.0001	0.0002	0.0002	0.0002
40-44	0.0002	0.0002	0.0003	0.0003	0.0002
45-49	0.0005	0.0006	0.0006	0.0006	0.0005
50-54	0.0012	0.0011	0.0014	0.0015	0.0015
55-59	0.0032	0.0029	0.0043	0.0043	0.0030
60-64	0.0064	0.0056	0.0096	0.0086	0.0060
65-69	0.0020	0.0007	0.0037	0.0033	0.0020
70-74	0.0045	0.0012	0.0008	0.0008	0.0020
75-79	0.0110	0.0034	0.0002	0.0002	0.0020
80	0.0000	0.0000	0.0000	0.0000	0.0000

THREE: APPENDICES

DISABILITY RATES

continued

Actual, Old, and New Disabled Retirement Rates

PERS (*continued*)

PERS Plan 3 Disability Rates					
Age	Actual		Old		New
	Male	Female	Male	Female	Male/Female
20-24	0.0000	0.0000	0.0000	0.0000	0.0000
25-29	0.0000	0.0000	0.0001	0.0000	0.0001
30-34	0.0000	0.0000	0.0001	0.0001	0.0001
35-39	0.0001	0.0000	0.0002	0.0002	0.0001
40-44	0.0000	0.0002	0.0003	0.0003	0.0001
45-49	0.0003	0.0005	0.0006	0.0006	0.0002
50-54	0.0008	0.0009	0.0014	0.0015	0.0006
55-59	0.0013	0.0006	0.0043	0.0043	0.0012
60-64	0.0019	0.0013	0.0096	0.0086	0.0024
65-69	0.0028	0.0000	0.0037	0.0033	0.0008
70-74	0.0000	0.0000	0.0008	0.0008	0.0008
75-79	0.0000	0.0000	0.0002	0.0002	0.0008
80	0.0000	0.0000	0.0000	0.0000	0.0000

THREE: APPENDICES

DISABILITY RATES

continued

Actual, Old, and New Disabled Retirement Rates

TRS

TRS Plan 1 Disability Rates					
Age	Actual		Old		New
	Male	Female	Male	Female	Male/Female
20-24	0.0000	0.0000	0.0000	0.0000	0.0000
25-29	0.0000	0.0000	0.0001	0.0001	0.0000
30-34	0.0000	0.0000	0.0002	0.0002	0.0000
35-39	0.0000	0.0000	0.0004	0.0004	0.0000
40-44	0.0000	0.0000	0.0006	0.0006	0.0000
45-49	0.0000	0.0000	0.0012	0.0012	0.0000
50-54	0.0000	0.0000	0.0022	0.0023	0.0000
55-59	0.0323	0.0000	0.0038	0.0039	0.0000
60-64	0.0000	0.0000	0.0059	0.0060	0.0000
65-69	0.0000	0.0000	0.0035	0.0036	0.0000
70-74	0.0000	0.0000	0.0009	0.0009	0.0000
75-79	0.0000	0.0000	0.0002	0.0002	0.0000
80	0.0000	0.0000	0.0000	0.0000	0.0000

TRS Plan 2 Disability Rates					
Age	Actual		Old		New
	Male	Female	Male	Female	Male/Female
20-24	0.0000	0.0000	0.0000	0.0000	0.0000
25-29	0.0000	0.0000	0.0000	0.0000	0.0001
30-34	0.0000	0.0000	0.0001	0.0001	0.0001
35-39	0.0002	0.0002	0.0001	0.0001	0.0002
40-44	0.0000	0.0000	0.0002	0.0001	0.0002
45-49	0.0002	0.0002	0.0003	0.0003	0.0005
50-54	0.0005	0.0003	0.0006	0.0005	0.0015
55-59	0.0023	0.0019	0.0016	0.0011	0.0030
60-64	0.0034	0.0032	0.0035	0.0028	0.0060
65-69	0.0000	0.0000	0.0013	0.0009	0.0020
70-74	0.0000	0.0000	0.0002	0.0002	0.0020
75-79	0.0000	0.0000	0.0000	0.0000	0.0020
80	0.0000	0.0000	0.0000	0.0000	0.0000

THREE: APPENDICES

DISABILITY RATES

continued

Actual, Old, and New Disabled Retirement Rates

TRS (continued)

TRS Plan 3 Disability Rates					
Age	Actual		Old		New
	Male	Female	Male	Female	Male/Female
20-24	0.0000	0.0000	0.0000	0.0000	0.0000
25-29	0.0000	0.0000	0.0000	0.0000	0.0001
30-34	0.0000	0.0000	0.0001	0.0001	0.0001
35-39	0.0000	0.0000	0.0001	0.0001	0.0001
40-44	0.0001	0.0000	0.0002	0.0001	0.0001
45-49	0.0002	0.0001	0.0003	0.0003	0.0002
50-54	0.0003	0.0003	0.0006	0.0005	0.0006
55-59	0.0006	0.0005	0.0016	0.0011	0.0012
60-64	0.0005	0.0012	0.0035	0.0028	0.0024
65-69	0.0000	0.0000	0.0013	0.0009	0.0008
70-74	0.0000	0.0000	0.0002	0.0002	0.0008
75-79	0.0000	0.0000	0.0000	0.0000	0.0008
80	0.0000	0.0000	0.0000	0.0000	0.0000

THREE: APPENDICES

DISABILITY RATES

continued

Actual, Old, and New Disabled Retirement Rates

SERS

SERS Plan 2 Disability Rates					
Age	Actual		Old		New
	Male	Female	Male	Female	Male/Female
20-24	0.0000	0.0000	0.0000	0.0000	0.0000
25-29	0.0000	0.0000	0.0000	0.0000	0.0001
30-34	0.0000	0.0000	0.0000	0.0001	0.0001
35-39	0.0002	0.0001	0.0001	0.0002	0.0002
40-44	0.0001	0.0001	0.0004	0.0001	0.0002
45-49	0.0005	0.0003	0.0008	0.0003	0.0005
50-54	0.0012	0.0006	0.0017	0.0010	0.0015
55-59	0.0037	0.0021	0.0040	0.0028	0.0030
60-64	0.0074	0.0036	0.0084	0.0057	0.0060
65-69	0.0021	0.0010	0.0035	0.0030	0.0020
70-74	0.0000	0.0000	0.0008	0.0013	0.0020
75-79	0.0000	0.0000	0.0002	0.0006	0.0020
80	0.0000	0.0000	0.0000	0.0000	0.0000

SERS Plan 3 Disability Rates					
Age	Actual		Old		New
	Male	Female	Male	Female	Male/Female
20-24	0.0000	0.0000	0.0000	0.0000	0.0000
25-29	0.0000	0.0000	0.0000	0.0000	0.0001
30-34	0.0000	0.0001	0.0000	0.0001	0.0001
35-39	0.0000	0.0000	0.0001	0.0002	0.0001
40-44	0.0001	0.0001	0.0004	0.0001	0.0001
45-49	0.0001	0.0003	0.0008	0.0003	0.0002
50-54	0.0012	0.0004	0.0017	0.0010	0.0006
55-59	0.0003	0.0005	0.0040	0.0028	0.0012
60-64	0.0010	0.0008	0.0084	0.0057	0.0024
65-69	0.0007	0.0000	0.0035	0.0030	0.0008
70-74	0.0041	0.0000	0.0008	0.0013	0.0008
75-79	0.0000	0.0000	0.0002	0.0006	0.0008
80	0.0000	0.0000	0.0000	0.0000	0.0000

THREE: APPENDICES

DISABILITY RATES

continued

Actual, Old, and New Disabled Retirement Rates

PERS-TRS-SERS

PERS-TRS-SERS Plans 2 Disability Rates				
Age	Actual	Old		New
	Male/Female	Male	Female	Male/Female
20-24	0.0000	0.0000	0.0000	0.0000
25-29	0.0000	0.0001	0.0000	0.0001
30-34	0.0000	0.0001	0.0001	0.0001
35-39	0.0001	0.0002	0.0002	0.0002
40-44	0.0002	0.0003	0.0003	0.0002
45-49	0.0005	0.0006	0.0006	0.0005
50-54	0.0010	0.0013	0.0013	0.0015
55-59	0.0028	0.0042	0.0037	0.0030
60-64	0.0056	0.0092	0.0075	0.0060
65-69	0.0015	0.0035	0.0029	0.0020
70-74	0.0022	0.0008	0.0008	0.0020
75-79	0.0059	0.0002	0.0002	0.0020
80	0.0000	0.0000	0.0000	0.0000

PERS-TRS-SERS Plans 3 Disability Rates				
Age	Actual	Old		New
	Male/Female	Male	Female	Male/Female
20-24	0.0000	0.0000	0.0000	0.0000
25-29	0.0000	0.0000	0.0000	0.0001
30-34	0.0000	0.0001	0.0001	0.0001
35-39	0.0000	0.0001	0.0002	0.0001
40-44	0.0001	0.0003	0.0002	0.0001
45-49	0.0002	0.0006	0.0003	0.0002
50-54	0.0005	0.0012	0.0008	0.0006
55-59	0.0006	0.0032	0.0023	0.0012
60-64	0.0011	0.0069	0.0049	0.0024
65-69	0.0009	0.0027	0.0022	0.0008
70-74	0.0018	0.0006	0.0008	0.0008
75-79	0.0000	0.0001	0.0003	0.0008
80	0.0000	0.0000	0.0000	0.0000

THREE: APPENDICES

DISABILITY RATES

continued

Actual, Old, and New Disabled Retirement Rates

PSERS

PSERS Plan 2 Disability Rates								
Age	Actual		Old				New	
	Male	Female	MS < 10		MS >= 10		MS < 10 Male/Female	MS >= 10
			Male	Female	Male	Female		
20-24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25-29	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000	0.0001	0.0002
30-34	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002
35-39	0.0000	0.0000	0.0002	0.0002	0.0002	0.0003	0.0002	0.0003
40-44	0.0000	0.0000	0.0002	0.0003	0.0004	0.0004	0.0002	0.0003
45-49	0.0005	0.0000	0.0005	0.0005	0.0008	0.0008	0.0005	0.0008
50-54	0.0006	0.0013	0.0009	0.0010	0.0018	0.0019	0.0015	0.0025
55-59	0.0016	0.0013	0.0026	0.0028	0.0057	0.0056	0.0030	0.0045
60-64	0.0062	0.0078	0.0079	0.0077	0.0000	0.0000	0.0060	0.0090
65-69	0.0000	0.0000	0.0061	0.0053	0.0000	0.0000	0.0020	0.0030
70-74	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0030
75-79	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0030
80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

THREE: APPENDICES

DISABILITY RATES

continued

Actual, Old, and New Disabled Retirement Rates

LEOFF

LEOFF Plan 1 Disability Rates				
Age	Actual		Old	New
	Male	Female	Male/Female	Male/Female
20-24	0.0000	0.0000	0.0008	0.0000
25-29	0.0000	0.0000	0.0032	0.0000
30-34	0.0000	0.0000	0.0090	0.0000
35-39	0.0000	0.0000	0.0154	0.0000
40-44	0.0000	0.0000	0.0231	0.0000
45-49	0.0000	0.0000	0.0440	0.0000
50-54	0.0000	0.0000	0.0657	0.0000
55-59	0.0000	0.0000	0.0790	0.0000
60-64	0.0000	0.0000	0.0840	0.0000
65-69	0.0000	0.0000	0.0480	0.0000
70-74	0.0000	0.0000	0.0000	0.0000
75-79	0.0000	0.0000	0.0000	0.0000
80	0.0000	0.0000	0.0000	0.0000

LEOFF Plan 2 Disability Rates				
Age	Actual		Old	New
	Male	Female	Male/Female	Male/Female
20-24	0.0000	0.0000	0.0001	0.0000
25-29	0.0001	0.0000	0.0003	0.0001
30-34	0.0001	0.0009	0.0006	0.0002
35-39	0.0004	0.0024	0.0011	0.0010
40-44	0.0009	0.0022	0.0015	0.0010
45-49	0.0011	0.0036	0.0023	0.0020
50-54	0.0037	0.0059	0.0041	0.0040
55-59	0.0058	0.0095	0.0069	0.0060
60-64	0.0063	0.0119	0.0119	0.0070
65-69	0.0039	0.0000	0.0039	0.0036
70-74	0.0000	0.0000	0.0000	0.0036
75-79	0.0000	0.0000	0.0000	0.0036
80	0.0000	0.0000	0.0000	0.0000

THREE: APPENDICES

DISABILITY RATES

continued

Actual, Old, and New Disabled Retirement Rates

WSPRS

WSPRS Plans 1/2 Disability Rates				
Age	Actual		Old	New
	Male	Female	Male/Female	Male/Female
20-24	0.0000	0.0000	0.0001	0.0003
25-29	0.0005	0.0000	0.0001	0.0003
30-34	0.0003	0.0000	0.0002	0.0003
35-39	0.0000	0.0000	0.0003	0.0003
40-44	0.0003	0.0033	0.0006	0.0003
45-49	0.0011	0.0000	0.0011	0.0015
50-54	0.0028	0.0000	0.0019	0.0015
55-59	0.0000	0.0000	0.0015	0.0015
60-64	0.0000	0.0000	0.0003	0.0015
65-69	0.0000	0.0000	0.0000	0.0015
70-74	0.0000	0.0000	0.0000	0.0015
75-79	0.0000	0.0000	0.0000	0.0015
80	0.0000	0.0000	0.0000	0.0000