

Section V – Demographic Assumptions

The charts below provide our recommended changes to this assumption and the resulting A/E (actual to expected) ratio.

COMPARATIVE RATES OF WITHDRAWAL

RATES OF WITHDRAWAL		
AGE	Present	Proposed
37 & under	8.00%	9.00%
40	8.00%	10.00%
45	8.50%	11.00%
50	8.50%	9.25%
55	9.00%	8.00%
58 & over	9.00%	8.00%

COMPARISON OF ACTUAL AND EXPECTED WITHDRAWALS BASED ON PROPOSED RATES

CENTRAL AGE OF GROUP	NUMBER OF WITHDRAWALS		
	PROPOSED RATES		
	Actual	Expected	Ratio of Actual to Expected
37 & under	9	7.8	1.154
40	15	11.1	1.351
45	18	12.8	1.406
50	12	10.8	1.111
55	12	12.7	0.945
58 & over	18	18.2	0.989
TOTAL	84	73.4	1.144



Section V – Demographic Assumptions

RATES OF DISABILITY RETIREMENT

Since there are no specific disability benefits payable from the System and the experience indicates no members are classified as disabled, we recommend no disability retirement rates be utilized at this time.



Section V – Demographic Assumptions

RATES OF RETIREMENT

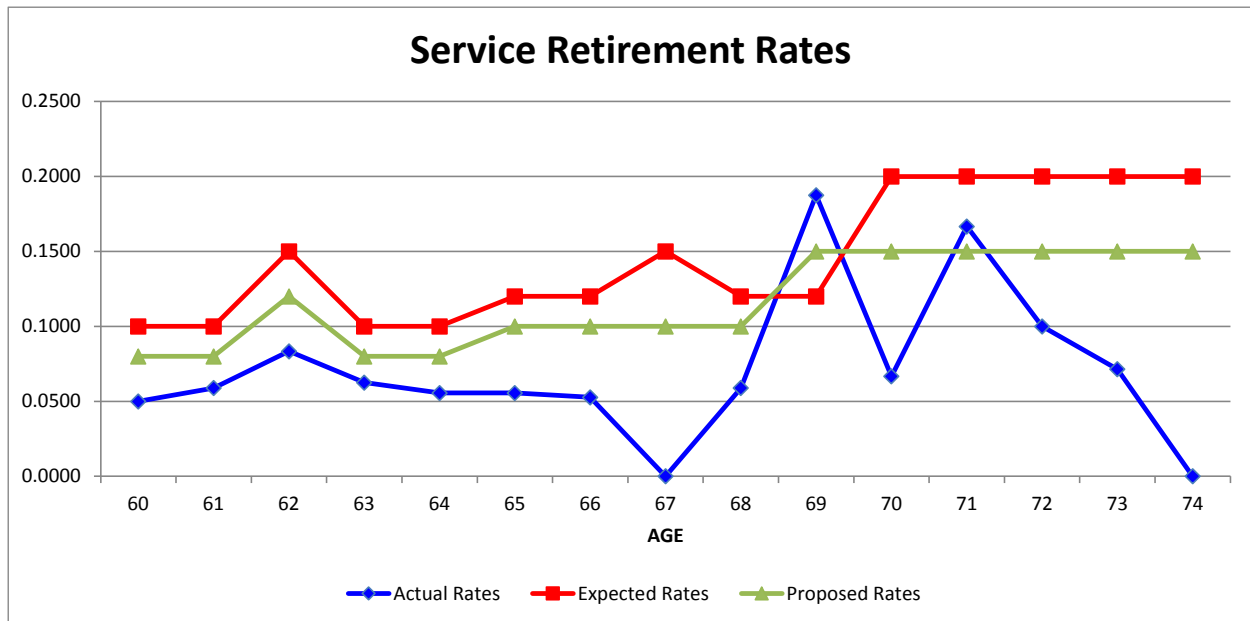
COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS

NUMBER OF SERVICE RETIREMENTS			
CENTRAL AGE OF GROUP	CURRENT RATES		
	Actual	Expected	Ratio of Actual to Expected
60	1	2.0	0.500
61	1	1.7	0.588
62	2	3.6	0.556
63	1	1.6	0.625
64	1	1.8	0.556
65	1	2.2	0.455
66	1	2.3	0.435
67	0	2.4	0.000
68	1	2.0	0.500
69	3	1.9	1.579
70	1	3.0	0.333
71	2	2.4	0.833
72	1	2.0	0.500
73	1	2.8	0.357
74	0	2.8	0.000
SUBTOTAL	17	34.5	0.493
75 & over	8	44.0	0.182
TOTAL	25	78.5	0.318

The analysis of the experience reflects that the current assumed rates of retirement under-anticipate retirements at most ages and in total over the five-year period. We recommend small adjustments to the rates to reflect the experience as well as maintain a reasonable degree of margin. The following graph shows a comparison of the present and actual rates of service retirements.



Section V – Demographic Assumptions



The charts below provide our recommended changes to this assumption and the resulting A/E (actual to expected) ratio.

COMPARITIVE RATES OF RETIREMENT

RATES OF WITHDRAWAL		
AGE	Present	Proposed
60 – 61	10%	8%
62	15%	12%
63 – 64	10%	8%
65 – 66	12%	10%
67	15%	10%
68	12%	10%
69	12%	15%
70 – 74	20%	15%
75 - 79	100%	15%
80 & over	100%	100%



Section V – Demographic Assumptions

**COMPARISON OF ACTUAL AND EXPECTED RETIREMENTS
BASED ON PROPOSED RATES**

NUMBER OF SERVICE RETIREMENTS			
CENTRAL AGE OF GROUP	PROPOSED RATES		
	Actual	Expected	Ratio of Actual to Expected
60	1	1.6	0.625
61	1	1.4	0.714
62	2	2.9	0.690
63	1	1.3	0.769
64	1	1.4	0.714
65	1	1.8	0.556
66	1	1.9	0.526
67	0	1.6	0.000
68	1	1.7	0.588
69	3	2.4	1.250
70	1	2.3	0.435
71	2	1.8	1.111
72	1	1.5	0.667
73	1	2.1	0.476
74	0	2.1	0.000
SUBTOTAL	17	27.8	0.612
75 & over	8	10.1	0.792
TOTAL	25	37.9	0.660



Section V – Demographic Assumptions

RATES OF MORTALITY

Post-Retirement Mortality Rates

Since the Fund has minimal post-retirement mortality experience, we recommend that the rates of post-retirement mortality be revised to the same mortality tables used for the Employees’ Retirement System of Georgia. We believe the new Pub-2010 tables would be a good choice and we recommend changing the mortality basis for LRS so that all ERS plans can share a common family of tables. We also recommend the most recent mortality improvement scale, MP-2019, be used to anticipate future mortality improvements in the valuation process through at least the next experience study.

Therefore, our recommended mortality assumption for service retirees is based on the Pub-2010 healthy annuitant tables, with adjustments as outlined below to better fit actual experience, projected generationally with the MP-2019 scale.

<u>Group</u>	<u>Membership Table</u>	<u>Set Forward (+)/ Setback (-)</u>	<u>Adjustment to Rates</u>
Service Retirees	General	Male: +1, Female: +1	Male: 105%, Female: 108%
Beneficiaries	General	Male: +2, Female: +2	Male: 106%, Female: 105%

Since there are no disability retirements in the Fund, we recommend no disability mortality rates be utilized at this time.

Pre-Retirement Mortality

Since the Fund has minimal pre-retirement mortality experience, we recommend that the rates of mortality in active service for both males and females be changed to the same mortality table that is used for the Employees’ Retirement Fund of Georgia. The recommended table is the Pub-2010 General Employee Table, with no adjustments, projected generationally with the MP-2019 scale.



Section VI – Other Assumptions and Methods

ADMINISTRATIVE EXPENSES: Currently, budgeted administrative expenses for the fiscal year are added to the normal cost. **We recommend that an annual amount of \$300,000 be added to normal cost.**

COST OF LIVING: Currently, we assume cost of living increases of 1.5% semi-annually. **We recommend maintaining this assumption.**

OPTION FACTORS: The option factors currently used by the Retirement System are based on the mortality tables used in the valuation. **We recommend that the factors be revised to be based on the mortality table recommended for the valuation.**

PERCENT MARRIED: Currently, 90% of active members are assumed to be married with the male three years older than his spouse. **We recommend maintaining this assumption.**



Appendix A – Historical June CPI(U) Index

Year	CPI (U)	Year	CPI (U)
1961	29.8	1991	136.0
1962	30.2	1992	140.2
1963	30.6	1993	144.4
1964	31.0	1994	148.0
1965	31.6	1995	152.5
1966	32.4	1996	156.7
1967	33.3	1997	160.3
1968	35.7	1998	163.0
1969	34.7	1999	166.2
1970	38.8	2000	172.4
1971	40.6	2001	178.0
1972	41.7	2002	179.9
1973	44.2	2003	183.7
1974	49.0	2004	189.7
1975	53.6	2005	194.5
1976	56.8	2006	202.9
1977	60.7	2007	208.352
1978	65.2	2008	218.815
1979	72.3	2009	215.693
1980	82.7	2010	217.965
1981	90.6	2011	225.722
1982	97.0	2012	229.478
1983	99.5	2013	233.504
1984	103.7	2014	238.343
1985	107.6	2015	238.638
1986	109.5	2016	241.018
1987	113.5	2017	244.955
1988	118.0	2018	251.989
1989	124.1	2019	256.143
1990	129.9	2020	257.797



Appendix B – Capital Market Assumptions and Asset Allocation

As Provided by the System

Arithmetic Rates of Return and Standard Deviations by Asset Class

Asset Class	Expected Rate of Return*	Standard Deviation
Fixed Income	1.4%	2.3%
US Large Stocks	12.1%	19.8%
US Small Stocks	16.3%	31.5%
Int'l Developed Mkt Stocks	12.1%	21.8%
Int'l Emerging Mkt Stocks	13.3%	31.7%
Alternatives	13.5%	27.9%

*Includes 2.90% assumed inflation

Asset Class Correlation Coefficients

Asset Class	Fixed Income	US Large Stocks	US Small Stocks	Int'l Dev Mkt Stocks	Int'l EM Mkt Stocks	Alts
Fixed Income	1.00					
US Large Stocks	0.01	1.00				
US Small Stocks	(0.09)	0.79	1.00			
Int'l Developed Mkt Stocks	(0.11)	0.67	0.51	1.00		
Int'l Emerging Mkt Stocks	(0.11)	0.67	0.51	0.72	1.00	
Alternatives	0.31	0.74	0.74	0.64	0.62	1.00

Asset Allocation Targets

Asset Class	Asset Allocation
Fixed Income	30.0%
US Large Stocks	46.4%
US Small Stocks	1.1%
Int'l Developed Mkt Stocks	11.7%
Int'l Emerging Mkt Stocks	5.8%
Alternatives	5.0%



Appendix B – Capital Market Assumptions and Asset Allocation

**As Determined by the 2020 Horizon Actuarial Services, LLC.
Survey of Capital Market Assumptions (20-year Horizon)**

Arithmetic Rates of Return and Standard Deviations by Asset Class

Asset Class	Expected Rate of Return*	Standard Deviation
Fixed Income	2.28%	1.78%
US Large Stocks	8.36%	16.22%
US Small Stocks	9.54%	20.22%
Int'l Developed Mkt Stocks	9.09%	18.05%
Int'l Emerging Mkt Stocks	11.33%	24.23%
Alternatives (Private Equity)	12.54%	21.99%

*Includes 2.17% assumed inflation

Asset Class Correlation Coefficients

Asset Class	Fixed Income	US Large Stocks	US Small Stocks	Int'l Dev Mkt Stocks	Int'l EM Mkt Stocks	Alts
Fixed Income	1.00					
US Large Stocks	(0.08)	1.00				
US Small Stocks	(0.08)	0.89	1.00			
Int'l Developed Mkt Stocks	(0.07)	0.84	0.76	1.00		
Int'l Emerging Mkt Stocks	(0.06)	0.73	0.69	0.80	1.00	
Alternatives (Private Equity)	(0.06)	0.73	0.71	0.67	0.59	1.00



TABLE 1
RATES OF SEPARATION FROM ACTIVE SERVICE

AGE	RATES OF WITHDRAWAL	BASE RATES OF DEATH*		RATES OF SERVICE RETIREMENT
		MALES	FEMALES	
25	0.09	0.00028	0.00009	
26	0.09	0.00030	0.00010	
27	0.09	0.00031	0.00011	
28	0.09	0.00033	0.00012	
29	0.09	0.00034	0.00013	
30	0.09	0.00036	0.00015	
31	0.09	0.00038	0.00016	
32	0.09	0.00040	0.00018	
33	0.09	0.00042	0.00019	
34	0.09	0.00044	0.00021	
35	0.09	0.00047	0.00023	
36	0.09	0.00050	0.00025	
37	0.09	0.00053	0.00028	
38	0.10	0.00057	0.00030	
39	0.10	0.00061	0.00033	
40	0.10	0.00066	0.00036	
41	0.10	0.00071	0.00040	
42	0.10	0.00077	0.00043	
43	0.11	0.00083	0.00047	
44	0.11	0.00090	0.00051	
45	0.11	0.00098	0.00056	
46	0.11	0.00107	0.00061	
47	0.11	0.00116	0.00066	
48	0.09	0.00127	0.00071	
49	0.09	0.00138	0.00077	
50	0.09	0.00149	0.00083	
51	0.09	0.00162	0.00090	
52	0.09	0.00175	0.00097	
53	0.08	0.00189	0.00105	
54	0.08	0.00203	0.00113	
55	0.08	0.00219	0.00123	
56	0.08	0.00236	0.00133	
57	0.08	0.00255	0.00144	
58	0.08	0.00275	0.00156	
59	0.08	0.00296	0.00170	
60	0.08	0.00319	0.00186	0.08
61	0.08	0.00344	0.00203	0.08
62	0.08	0.00371	0.00222	0.12
63	0.08	0.00401	0.00244	0.08
64	0.08	0.00433	0.00269	0.08
65	0.08	0.00468	0.00296	0.10
66	0.08	0.00506	0.00327	0.10
67	0.08	0.00548	0.00362	0.10
68	0.08	0.00594	0.00400	0.10
69	0.08	0.00646	0.00442	0.15
70	0.08	0.00703	0.00489	0.15
71	0.08	0.00767	0.00541	0.15
72	0.08	0.00837	0.00598	0.15
73	0.08	0.00915	0.00661	0.15
74	0.08	0.01001	0.00731	0.15
75	0.08	0.01096	0.00808	0.15
76	0.08	0.01200	0.00893	0.15
77	0.08	0.01315	0.00986	0.15
78	0.08	0.01440	0.01090	0.15
79	0.08	0.01578	0.01204	0.15
80	0.00	0.01730	0.01330	1.00

*Base mortality rates as of 2010 before application of the improvement scale



Appendix C – Recommended Rates

TABLE 2

BASE RATES OF MORTALITY FOR MEMBERS RETIRED ON ACCOUNT OF SERVICE*

AGE	MALES	FEMALES	AGE	MALES	FEMALES
19	0.00039	0.00014	70	0.01788	0.01286
20	0.00038	0.00013	71	0.01999	0.01442
21	0.00035	0.00012	72	0.02236	0.01617
22	0.00033	0.00011	73	0.02503	0.01813
23	0.00031	0.00010	74	0.02805	0.02034
24	0.00029	0.00010	75	0.03145	0.02280
25	0.00032	0.00011	76	0.03529	0.02557
26	0.00033	0.00012	77	0.03964	0.02871
27	0.00035	0.00013	78	0.04455	0.03225
28	0.00036	0.00014	79	0.05013	0.03629
29	0.00038	0.00016	80	0.05643	0.04090
30	0.00040	0.00017	81	0.06355	0.04618
31	0.00042	0.00019	82	0.07152	0.05221
32	0.00044	0.00021	83	0.08039	0.05912
33	0.00046	0.00023	84	0.09021	0.06701
34	0.00049	0.00025	85	0.10096	0.07604
35	0.00053	0.00027	86	0.11270	0.08626
36	0.00056	0.00030	87	0.12544	0.09770
37	0.00060	0.00032	88	0.13923	0.11033
38	0.00064	0.00036	89	0.15406	0.12406
39	0.00069	0.00039	90	0.16979	0.13860
40	0.00075	0.00043	91	0.18632	0.15378
41	0.00081	0.00046	92	0.20362	0.16958
42	0.00087	0.00051	93	0.22162	0.18606
43	0.00095	0.00055	94	0.24032	0.20331
44	0.00103	0.00061	95	0.25968	0.22145
45	0.00112	0.00066	96	0.27966	0.24060
46	0.00122	0.00071	97	0.30018	0.26079
47	0.00133	0.00077	98	0.32115	0.28202
48	0.00145	0.00083	99	0.34240	0.30413
49	0.00313	0.00240	100	0.36368	0.32686
50	0.00337	0.00252	101	0.38472	0.34973
51	0.00363	0.00266	102	0.40534	0.37254
52	0.00391	0.00280	103	0.42538	0.39508
53	0.00421	0.00294	104	0.44470	0.41715
54	0.00453	0.00309	105	0.46319	0.43858
55	0.00486	0.00325	106	0.48075	0.45921
56	0.00522	0.00343	107	0.49732	0.47888
57	0.00560	0.00363	108	0.51285	0.49752
58	0.00602	0.00387	109	0.52500	0.51505
59	0.00646	0.00415	110	0.52500	0.53141
60	0.00694	0.00449	111	0.52500	0.54000
61	0.00749	0.00490	112	0.52500	0.54000
62	0.00809	0.00540	113	0.52500	0.54000
63	0.00878	0.00596	114	0.52500	0.54000
64	0.00959	0.00662	115	0.52500	0.54000
65	0.01053	0.00737	116	0.52500	0.54000
66	0.01163	0.00821	117	0.52500	0.54000
67	0.01291	0.00917	118	0.52500	0.54000
68	0.01436	0.01026	119	1.00000	1.00000
69	0.01602	0.01148	120	1.00000	1.00000

*Base mortality rates as of 2010 before application of the improvement scale



Appendix C – Recommended Rates

TABLE 3

BASE RATES OF MORTALITY FOR BENEFICIARIES OF DECEASED MEMBERS*

AGE	MALES	FEMALES	AGE	MALES	FEMALES
19	0.00038	0.00013	70	0.02716	0.01700
20	0.00035	0.00012	71	0.02980	0.01866
21	0.00033	0.00011	72	0.03269	0.02051
22	0.00031	0.00010	73	0.03585	0.02259
23	0.00030	0.00010	74	0.03928	0.02490
24	0.00032	0.00011	75	0.04304	0.02750
25	0.00033	0.00012	76	0.04717	0.03043
26	0.00035	0.00013	77	0.05173	0.03375
27	0.00036	0.00014	78	0.05682	0.03752
28	0.00038	0.00016	79	0.06251	0.04184
29	0.00040	0.00017	80	0.06888	0.04678
30	0.00042	0.00019	81	0.07599	0.05244
31	0.00045	0.00020	82	0.08390	0.05892
32	0.00047	0.00022	83	0.09268	0.06632
33	0.00050	0.00024	84	0.10238	0.07478
34	0.00053	0.00026	85	0.11305	0.08432
35	0.00056	0.00029	86	0.12474	0.09493
36	0.00060	0.00032	87	0.13757	0.10653
37	0.00065	0.00035	88	0.15283	0.11896
38	0.00070	0.00038	89	0.16904	0.13226
39	0.00075	0.00042	90	0.18608	0.14650
40	0.00082	0.00045	91	0.20390	0.16171
41	0.00088	0.00049	92	0.22245	0.17793
42	0.00095	0.00054	93	0.24168	0.19520
43	0.00582	0.00275	94	0.26154	0.21349
44	0.00606	0.00287	95	0.28197	0.23278
45	0.00632	0.00298	96	0.30288	0.25299
46	0.00658	0.00311	97	0.32416	0.27402
47	0.00685	0.00323	98	0.34566	0.29568
48	0.00743	0.00336	99	0.36714	0.31778
49	0.00767	0.00359	100	0.38838	0.34001
50	0.00792	0.00384	101	0.40920	0.36219
51	0.00817	0.00411	102	0.42943	0.38410
52	0.00845	0.00438	103	0.44893	0.40556
53	0.00873	0.00468	104	0.46760	0.42640
54	0.00905	0.00500	105	0.48533	0.44645
55	0.00940	0.00533	106	0.50206	0.46558
56	0.00979	0.00570	107	0.51774	0.48370
57	0.01023	0.00610	108	0.53000	0.50075
58	0.01073	0.00653	109	0.53000	0.51665
59	0.01131	0.00700	110	0.53000	0.52500
60	0.01198	0.00753	111	0.53000	0.52500
61	0.01274	0.00811	112	0.53000	0.52500
62	0.01363	0.00875	113	0.53000	0.52500
63	0.01467	0.00944	114	0.53000	0.52500
64	0.01587	0.01022	115	0.53000	0.52500
65	0.01726	0.01106	116	0.53000	0.52500
66	0.01883	0.01200	117	0.53000	0.52500
67	0.02060	0.01304	118	1.00000	1.00000
68	0.02257	0.01421	119	1.00000	1.00000
69	0.02475	0.01552	120	1.00000	1.00000

*Base mortality rates as of 2010 before application of the improvement scale