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SECRETARY

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**Correspondence Memorandum**

**Date:** March 1, 2023  
**To:** Employee Trust Funds Board  
**From:** Cindy Klimke-Armatoski  
Chief Trust Financial Officer  
**Subject:** December 31, 2022, Actuarial Valuation of Retired Lives

**The Department of Employee Trust Funds (ETF) requests the Employee Trust Funds Board (Board) approve the report, 40<sup>th</sup> Annual Actuarial Valuation of Retired Lives as of December 31, 2022.**

Gabriel Roeder Smith & Company (GRS) has completed the actuarial valuation of the Wisconsin Retirement System retired lives as of December 31, 2022. This valuation determines the amounts to be transferred from member and employer accounts to fund 2022 new annuities and the amount available to adjust existing Core and Variable annuities. Increases or decreases will first be included on May 1, 2023, annuity payments.

GRS calculated that Core annuities should be increased by 1.6%. This is based on factors such as investment performance, the 6.5% effective rate interest credited to the Core annuity reserve, and mortality experienced during the last year. The increase will be applied to all Core annuities except those originating in 2022, which will receive a prorated increase.

GRS calculated that Variable annuities should be decreased by 21%. This is based on factors such as investment performance, the -18% effective rate interest credited to the Variable annuity reserve, and mortality experienced during the last year. The Variable annuity decrease will be applied equally to all Variable annuities, regardless of the effective date.

Pursuant to provisions of the Wisconsin Administrative Code, Secretary Voelker and the Board Chair, William Ford, reviewed and approved the recommended rates which were announced to the public. Actuaries from GRS will be at the Board meeting to present the report and answer questions.

Attachment: 40<sup>th</sup> Annual Actuarial Valuation of Retired Lives

Reviewed and approved by John Voelker, Secretary  
Electronically Signed 03/03/23

Board	Mtg Date	Item #
ETF	3.23.23	6B

# Wisconsin Retirement System

40th Annual Actuarial Valuation of Retired Lives

December 31, 2022



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March 1, 2023

Employee Trust Funds Board  
Madison, Wisconsin

Ladies and Gentlemen:

The results of the **40th annual actuarial valuation of core and variable annuities** being paid from the Wisconsin Retirement System are presented in this report. The purpose of this report is to establish the ratio of assets to liabilities in the Core and Variable Funds and to make recommendations for related benefit adjustments in accordance with statutory provisions and administrative code. This report should not be relied on for any other purpose.

The date of this valuation was December 31, 2022. Actuarial assumptions used in the valuation are summarized in the Appendix. The assumptions and methods were unchanged from those used in the prior valuation.

The results of the valuation may be briefly summarized as follows (\$ millions):

	Core	Variable
Number of Annuitants	233,804	43,007
Annual Amount of Annuities Paid	\$ 6,409.7	\$ 578.5
Fund Balance	72,108.4	4,403.0
Actuarial Reserve	70,987.2	5,586.5
<b>Ratio</b>	<b>1.016</b>	<b>0.788</b>

**Based upon these results, core annuities will be increased 1.6% and variable annuities will be decreased by 21.0%.**

This report was prepared at the request of the Wisconsin Retirement System and those designated or approved by the Wisconsin Retirement System. This report may be provided to parties other than the Wisconsin Retirement System only in its entirety and only with the permission of the Wisconsin Retirement System. GRS is not responsible for unauthorized use of this report. The valuation was based upon data furnished by the Wisconsin Retirement System's staff, concerning Fund assets and individual annuitants and beneficiaries. Data was checked for internal consistency, but was not audited. We are not responsible for the accuracy or completeness of the information provided by the Wisconsin Retirement System.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or 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.

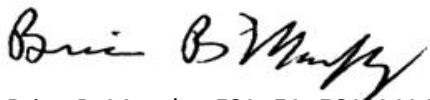
This report was prepared using our proprietary valuation model and related software which, in our professional judgment, has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

This report does not include an assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. However, an additional assessment of risk for the Wisconsin Retirement System was conducted in the fall of 2021 in conjunction with the State of Wisconsin Investment Board and the fall of 2020 by the Department of Employee Trust Funds. Additional discussion of various risk factors is also included in the active lives valuation report issued in June.

To the best of our knowledge this report is complete and accurate. All calculations have been made in conformity with generally accepted actuarial principles and practices and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. Brian B. Murphy, Mark Buis and James D. Anderson are all Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. The signing actuaries are independent of the plan sponsor.

The cooperation of the Secretary and his staff in gathering materials for this valuation is acknowledged with appreciation.

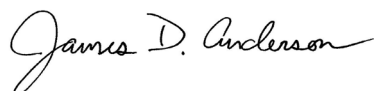
Respectfully submitted,  
Gabriel, Roeder, Smith & Company



Brian B. Murphy, FSA, EA, FCA, MAAA, PhD



Mark Buis, FSA, EA, FCA, MAAA



James D. Anderson, FSA, EA, FCA, MAAA

BBM/MB/JDA:rmn



## **SECTION A**

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### **EXECUTIVE SUMMARY**

# Executive Summary

## 1. Retiree Dividend in Core Annuities

The net of fee investment return of -12.92% in the core annuity fund was lower than the assumed investment return of 6.8% on a market value basis. However, under the asset valuation method, investment gains and losses are spread over a 5-year period. Partial recognition of this year's loss was combined with the continued phase-in of investment gains and losses from prior years resulting in a published effective earnings rate of 6.5%. The 6.5% published effective earnings rate exceeds the 5.0% investment return threshold that triggers an annuity adjustment. This valuation determined the amount of available surplus/deficit. The surplus in the core fund is \$1,121.2 million as of December 31, 2022. After adjusting for expected improvements in longevity and various other items (described in detail on page 6), **the result is a 1.6% increase in the core annuity benefit.**

## 2. Change in Variable Annuities

The variable fund effective earnings rate was -18.0% resulting in a deficit of \$1,183.5 million. The deficit of \$1,183.5 million will **result in a 21.0% decrease in all variable annuities in force.**

## 3. General Comments

Due to the asset smoothing method used in the core annuity fund, there are approximately \$6.9 billion in unrecognized asset losses as of December 31, 2022 which will be recognized over the next four years. Although only approximately half of this applies to the annuitant reserve, this may still decrease the probability of positive annuity adjustments in the future.

The present value of previously granted Core dividends is approximately \$13.4 billion prior to dividend adjustments and \$14.5 billion after the dividend adjustment. It is important that the value of dividend payments continue to build up in order to avoid the possibility of leveraged negative adjustments in the future. This buildup will happen naturally as long as investments in the core fund achieve results in excess of 5%.

## 4. Conclusion

In accordance with the Administrative Code, ETF 20.25, Section 40.27(2) and Section 40.28(2) of the Wisconsin Statutes:

- Core annuities will be increased by 1.6%, and
- Variable annuities will be decreased by 21.0%.

## **SECTION B**

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### **OPERATION OF THE RETIREMENT SYSTEM**



## Operation of the Retirement System

Each year, as of December 31, an actuarial valuation of the liability for retired persons receiving benefits from the Wisconsin Retirement System is conducted. The purpose of the valuation is to determine the actuarial present value of future benefit payments on behalf of current retired lives. This present value is the “actuarial reserve.” Theoretically, if an amount of money equal to the actuarial present value were invested at a yield equal to the valuation interest rate, the initial amount plus the continuing investment income would provide exactly the right amount of money to pay the annuities of all current retired persons and their beneficiaries for the rest of their lives. The fund would decrease each year, and would become zero many decades in the future when the last annuitant dies.

The above is a “closed group” description of the operation of the annuity reserve fund. But the fund is really an “open group.” The size of the fund does not actually decrease because each year more benefits are added to the rolls than are removed and fresh money is transferred into the annuity reserve fund to finance the benefits of the new annuitants. (The actuary calculates the reserve transfers for new annuitants each year as a by-product of the actuarial valuation.)

According to theory, the fund will eventually reach a state when the number of people entering (retiring) each year is approximately equal to the number of people exiting (dying) each year. When this mature state is reached, the amount of money in the fund will remain approximately level in constant dollars from year to year. Each year, the reserve transfers for the new annuitants plus real investment earnings on the whole fund (total money in) will be approximately equal to the benefit payments (total money out). The only source of growth in assets would be the result of the effects of inflation. The dollars in the fund would increase, but the “real” value of the fund would not change.

There are at least two factors that cause the actual operation to be different from the theoretical operation described above. The first is that annuitants may have longer or shorter lifetimes than expected. In recognition of this, the actuary monitors mortality experience of the retirement system and recommends a new mortality table when appropriate. The second factor is that actual investment earnings are rarely equal to the assumed rate. When either mortality or investment earnings differ from expectations, the difference, positive or negative, is recorded in a supplemental reserve. The operation of the supplemental reserve is described on the next page.



# Operation of the Retirement System

The Wisconsin Retirement System (WRS) maintains separate reserves for core and variable annuities.

The basic objective of the Core Fund is to earn an optimum long-term return while taking acceptable risk. The Core Fund has a significant amount of stocks, but also invests in other assets such as bonds, real estate and private equity. It is considered a fully diversified, balanced fund invested for the long-term needs of the Retirement System. The Variable Fund is an “all-stocks” fund. Participants in this fund are exposed to a higher degree of risk (because of possible losses from unfavorable stock market performance), in exchange for the possibility of greater returns over the life of the investment in the fund. Investment return in the Core Fund is smoothed via operation of the Market Recognition Account. Variable Fund returns are not smoothed.

Annuity adjustments for both Core and Variable annuities depend on whether or not returns credited to those funds exceed or fall short of 5%. Even if there are negative Core and/or Variable annuity adjustment rates, the Core portion of a participant’s annuity can never be decreased below the finalized initial amount. However, there is no limit to how much the Variable portion of a participant’s annuity can be reduced.

WRS’ practice with respect to annuity adjustments is described below.

**Core Annuity Division:** If the supplemental reserve is positive and is at least 0.5% of core annuity liabilities, core annuity increases (dividends) may be granted. If the supplemental reserve is negative and is equal to or greater than 0.5% of core annuity liabilities in absolute value, prior core annuity dividends are reduced by an aggregate amount equal to the shortfall. Increases or decreases are rounded to the nearest 1/10<sup>th</sup> of a percent and become effective in April following the December 31 valuation.

**Variable Annuity Division:** If the supplemental reserve is at least 2% of variable annuity liabilities, substantially all of the reserve (dropping fractions of a percent) is used to increase or decrease variable annuities for the ensuing year. Increases or decreases become effective in April following the December 31 valuation.

**In calculating both the dividend for the Core annuities and the adjustment for Variable annuities, a 5.0% assumed investment return is used to develop liabilities. Returns in excess of 5.0% can produce an increase in a member’s annuity. Returns below 5% may result in a decrease. Please see page 29 for a full description of the statutory provisions.**



## **SECTION C**

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### **CORE ANNUITIES**

## Core Annuity Division Development of Assets and Liabilities

	\$ Millions		Ratio
	Assets	Liabilities	
<b>Ending Balance December 31, 2021</b>	\$69,910.7	\$65,085.4	1.074
Closing Adjustments	4.6	0.0	
Variable Terminations	56.1	56.1	
2022 Core Annuity Average Adjustment: 7.4%	0.0	4,587.3	
<b>Beginning Balance January 1, 2022</b>	69,971.4	69,728.8	1.003
<b>Increases</b>			
Reserve Transfers	4,148.6	4,148.6	
Regular Interest (5%)	3,433.4	3,433.4	
Additional Earnings	841.6	0.0	
Addition for Experience Study	0.0	0.0	
Other	0.0	0.0	
<b>Total Increases</b>	8,423.6	7,582.0	
<b>Decreases</b>			
Annuities & Lump Sums	6,286.6	6,286.6	
Credit Re-establishments	0.0	0.0	
Subtraction for Experience Study	0.0	0.0	
Other	0.0	37.0	
<b>Total Decreases</b>	6,286.6	6,323.6	
<b>Ending Balance December 31, 2022</b>	<b>\$72,108.4</b>	<b>\$70,987.2</b>	<b>1.016</b>

The ending liability balance includes a data reserve of \$70.9 million and a liability for previously granted dividends of \$13,376 million (prior to any 2023 adjustments calculated in this December 31, 2022 valuation).

## Core Fund Reserve Transfer Recommendation

Amounts to be transferred from the Employer Reserve and the Employee Reserve to the Annuity Reserve to cover liabilities for new annuities are computed as the first step in the annual actuarial valuation. The actuarial present value at time of retirement of core annuities reported as new since the last actuarial valuation is \$4,126,973,122. Adjustments to prior transfers, related to estimated annuities for which final computations have now been made, totaled \$21,675,673. Reserve transfers are distributed as follows:

Group	Regular Transfer	Adjustment to Prior Transfer	Total Transfer
General	\$3,426,297,322	\$18,548,988	\$3,444,846,310
Protective with Social Security	533,701,455	2,434,191	536,135,646
Protective without Social Security	138,184,630	312,284	138,496,914
Executive & Elected	28,789,715	380,210	29,169,925
<b>Totals</b>	<b>\$4,126,973,122</b>	<b>\$21,675,673</b>	<b>\$4,148,648,795</b>

Accordingly, we recommend that \$4,148,648,795 be transferred to the Core Annuity Reserve. The results in this report assume that this transfer has been made.

## Discussion of Dividend

The Core Annuity Fund balance, \$72,108.4 million, was higher than the actuarial present value of core annuities and reserves, \$70,987.2 million, by \$1,121.2 million, which resulted in an annuity adjustment of 1.6%. The primary sources of the 1.6% adjustment are:

	<b>% of APV<sup>(1)</sup></b>
1. SWIB net of fee investment return	(12.92)%
2. MRA adjustment	19.42%
3. Published effective earnings rate	6.50%
4. Adjustment to relate earnings to average core annuity fund balance	(0.30)%
5. Earnings rate based on average balance	6.20%
6. Expected dividend before adjustments: 1.062/1.05-1	1.14%
7. Adjustment to relate average asset to ending liability	0.05%
8. Carryover from last year due to timing of dividend, accounting adjustments and rounding	0.34%
9. Experience study adjustment	0.00%
10. Experience and other effects	0.05%
11. Statutory adjustment to round to nearest one-tenth percent	0.02%
<b>12. Computed average dividend rate: (6)+(7)+(8)+(9)+(10)+(11)</b>	<b>1.6%</b>
13. Adjustment for members at or near the statutory floor	0.0%
<b>14. Final computed dividend rate: (12)+(13), if greater than 0.5% (or less than -0.5%) of core annuities, otherwise 0%</b>	<b>1.6%</b>

<sup>(1)</sup> Actuarial Present Value

**See pages 30 and 31 for a description of items on this page.**

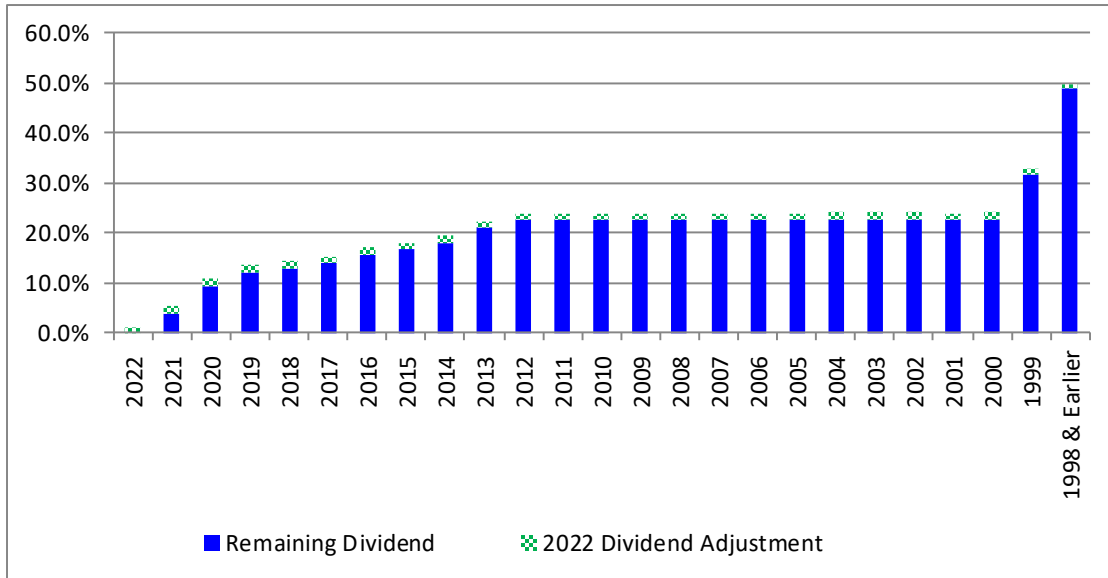
In accordance with the Administrative Code, ETF 20.25 and Section 40.27(2) Wisconsin Statutes (shown on page 29 of this report), the dividend adjustment is 1.6% effective April 1, 2023.



# Discussion of Dividend

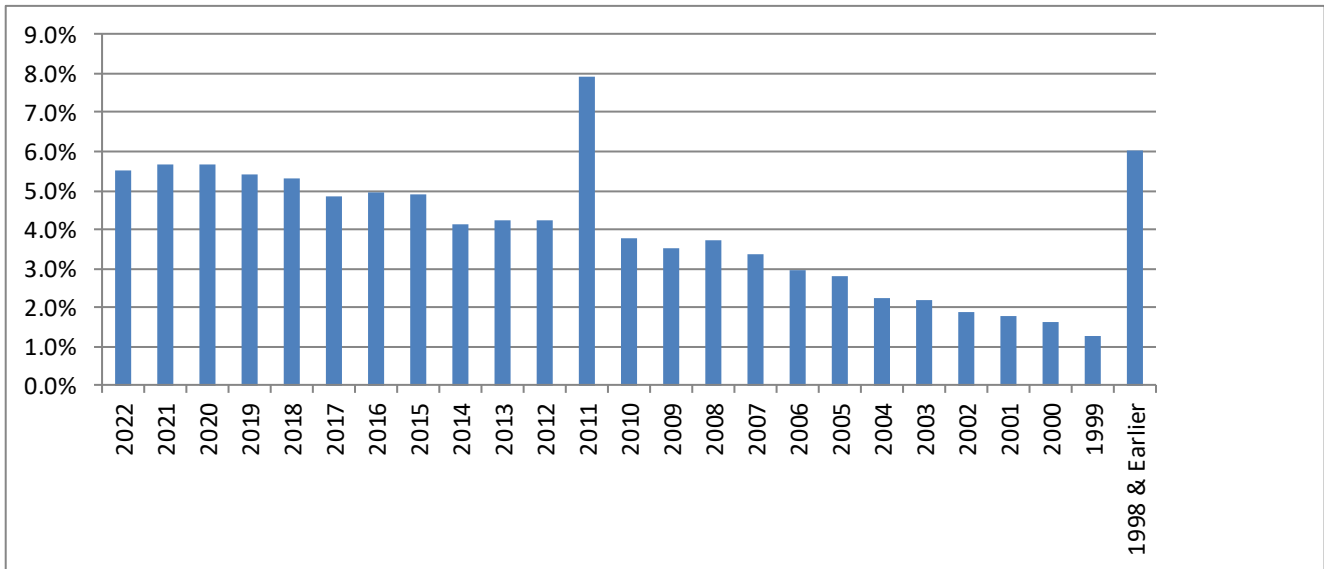
As shown on the prior page, the adjustment for core fund members is 1.6%.

## Dividend Remaining (as a Percentage of Total Benefit) by Year of Retirement



After the 2023 dividend adjustment, members retired prior to 2000 continue to have the highest dividend remaining as a percentage of total benefit and also represent a shrinking portion of the liabilities. The chart below shows liabilities by year of retirement.

## Liabilities (as a Percentage of Total) by Year of Retirement



Between 2008 and 2012, the liability for dividends decreased from about \$9.2 billion to \$3.0 billion. The value of previously granted dividends is approximately \$13.4 billion as of December 31, 2022 prior to the 2023 dividend adjustment and \$14.5 billion after the adjustment. In addition, there are currently about \$6.9 billion in unrecognized asset losses in the Market Recognition Account that will be recognized over the next four years, about half of which will be applied to the core annuitant reserve.

# Transfers to Annuity Reserve to Finance Core Annuities Approved in 2022 Tabulated by Type of Annuity and Option

Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
<b>REGULAR RETIREMENT</b>				
SL	Straight Life	1,816	\$ 38,906,980	\$ 539,090,597
SL	Straight Life (accelerated)	0	5,183,457	17,822,287
A60	Life Annuity with 60 payments guaranteed	837	15,468	88,099
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	84,060	927,842
A180	Life Annuity with 180 payments guaranteed	2,088	44,583,491	657,954,074
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	8,104,309	33,301,348
A180F	Life Annuity with 180 payments guaranteed (forced)	14	283,919	3,424,654
JOINT	Joint and 75% Survivor	886	23,470,836	363,355,908
JOINT	Joint and 75% Survivor (accelerated)	0	3,706,827	15,012,340
R25	Reduced 25% on First Death	394	10,853,832	160,924,628
R25	Reduced 25% on First Death (accelerated)	0	1,126,491	4,427,483
C100	100% Continued to Named Survivor	1,221	25,985,468	407,172,153
C100	100% Continued to Named Survivor (accelerated)	0	4,220,558	16,630,367
C180	100% Continued to Named Survivor with 180 payments guaranteed	3,399	90,737,340	1,452,420,058
C180	100% Continued to Named Survivor with 180 payments guaranteed (accelerated)	0	15,556,584	65,890,649
LOL	Life with Optional Length Guaranteed	2	41,987	445,406
AC24	Annuity Certain with 24 Payments	2	13,185	127,119
AC60	Annuity Certain with 60 Payments	1	225,496	1,820,802
AC120	Annuity Certain with 120 Payments	0	26,979	211,530
AC180	Annuity Certain between 24 and 180 Payments	0	149,327	1,229,347
SLNSD	Straight Life - Named Survivor Deceased	3	82,329	989,802
	Total Regular	10,663	\$ 273,358,923	\$ 3,743,266,493
	Average Age at Retirement	61.1 Years		
<b>DISABILITY RETIREMENT</b>				
SL	Straight Life	45	\$ 1,285,014	\$ 16,877,215
A60	Life Annuity with 60 payments guaranteed	11	17,700,800	248,256,054
A180	Life Annuity with 180 payments guaranteed	41	1,187,119	16,480,982
JOINT	Joint and 75% Survivor	12	392,536	6,156,482
R25	Reduced 25% on First Death	7	274,913	4,137,909
C100	100% Continued to Named Survivor	18	556,009	9,053,946
C180	100% Continued to Named Survivor with 180 payments guaranteed	108	3,203,677	53,741,730
AC24	Annuity Certain with 24 Payments	0	280,168	655,789
	Total Disability	242	\$ 24,880,236	\$ 355,360,107
	Average Age at Retirement	53.3 Years		
<b>DEATH-IN-SERVICE BENEFITS</b>				
SL	Straight Life	20	\$ 275,010	\$ 4,246,075
A60	Life Annuity with 60 payments guaranteed	3	238,353	2,962,464
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	2,377,970	8,745,754
A180	Life Annuity with 180 payments guaranteed	43	691,847	10,661,297
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	109,770	695,390
AC24	Annuity Certain with 24 Payments	0	218,309	1,035,542
	Total Death-in-Service	66	\$ 3,911,259	\$ 28,346,522
	Average Age at Retirement	55.3 Years		
<b>GRAND TOTAL</b>		<b>10,971</b>	<b>\$ 302,150,418</b>	<b>\$ 4,126,973,122</b>

*In cases where an individual is receiving more than one annuity, the person only appears once in the above number counts, but the corresponding annual amounts can show up in several different places, depending on the option elected for the different annuities. This can result in, for example, a number count of zero (or a very low number count) combined with a significant annual dollar amount in the above table.*





# Core Annuities Being Paid Tabulated by Type of Annuity and Option

Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
<b>REGULAR RETIREMENT</b>				
SL	Straight Life	31,653	\$ 755,241,475	\$ 7,998,684,278
SL	Straight Life (accelerated)	0	19,166,876	49,097,848
A60	Life Annuity with 60 payments guaranteed	21,349	518,155,025	5,197,860,734
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	10,715,064	25,788,894
A120	Life Annuity with 120 payments guaranteed	12	133,792	281,009
A180	Life Annuity with 180 payments guaranteed	44,676	1,032,580,223	10,985,110,438
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	37,860,592	104,954,228
A180F	Life Annuity with 180 payments guaranteed (forced)	356	3,768,531	32,735,818
JOINT	Joint and 75% Survivor	24,461	747,345,229	8,380,472,271
JOINT	Joint and 75% Survivor (accelerated)	0	15,952,099	42,977,086
R25	Reduced 25% on First Death	13,838	457,635,461	4,498,104,468
R25	Reduced 25% on First Death (accelerated)	0	6,380,337	17,811,145
C100	100% Continued to Named Survivor	22,470	579,659,301	6,934,307,782
C100	100% Continued to Named Survivor (accelerated)	0	16,288,968	45,809,732
C180	100% Continued to Named Survivor with 180 payments guaranteed	64,871	1,879,662,216	23,878,218,547
C180	100% Continued to Named Survivor with 180 payments guaranteed (accelerated)	0	74,947,699	220,682,274
LOL	Life with Optional Length Guaranteed	26	762,806	5,432,108
LOLF	Life with Optional Length Guaranteed (Forced)	2	15,736	81,731
AC24	Annuity Certain with 24 Payments	4	396,055	613,727
AC60	Annuity Certain with 60 Payments	11	914,384	2,507,500
AC120	Annuity Certain with 120 Payments	7	1,201,771	6,013,879
AC180	Annuity Certain between 24 and 180 Payments	5	1,972,270	9,318,457
C50	50% Continued to One Beneficiary	13	96,753	395,246
C50W180	50% Continued to One Beneficiary with 180 Months guaranteed	1	4,215	9,923
C75WSS	75% Continued to One Beneficiary and Social Security Integrated	14	283,337	1,009,017
A60WSS	Life with 60 Months Guaranteed and Social Security Integrated	7	25,854	49,212
A180WSS	Life with 180 Months Guaranteed and Social Security Integrated	8	148,180	338,501
PF6213	Police and Firemen s.62.13 *	8	254,476	856,406
SLNSD	Straight Life - Named Survivor Deceased	852	26,777,271	251,162,402
Total Regular		224,644	\$6,188,345,996	\$68,690,684,661

(concluded on next page)

*In cases where an individual is receiving more than one annuity, the person only appears once in the above number counts, but the corresponding annual amounts can show up in several different places, depending on the option elected for the different annuities. This can result in, for example, a number count of zero (or a very low number count) combined with a significant annual dollar amount in the above table.*



# Core Annuities Being Paid Tabulated by Type of Annuity and Option

Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
<b>DISABILITY RETIREMENT</b>				
SL	Straight Life <sup>(1)</sup>	2,246	\$ 55,427,354	\$ 411,577,804
A60	Life Annuity with 60 payments guaranteed	345	10,337,822	93,748,914
A180	Life Annuity with 180 payments guaranteed	1,029	29,565,177	300,322,213
JOINT	Joint and 75% Survivor	472	12,734,855	139,989,322
R25	Reduced 25% on First Death	180	4,859,949	52,272,871
C100	100% Continued to Named Survivor	1,079	23,252,495	254,927,359
C180	100% Continued to Named Survivor with 180 payments guaranteed	2,317	58,393,847	743,065,831
AC24	Annuity Certain with 24 Payments	0	3,914	4,404
DWSMC	Disability with Spouse or Minor/Dependent Child	1	20,284	116,823
PF6213	Police and Firemen s.62.13 *	4	79,982	418,843
SLNSD	Straight Life - Named Survivor Deceased	7	266,635	2,788,687
Total Disability		7,680	\$ 194,942,314	\$ 1,999,233,071
<b>DEATH-IN-SERVICE BENEFITS</b>				
SL	Straight Life	265	\$ 4,121,549	\$ 45,858,171
SL	Straight Life (accelerated)	0	108,500	387,526
A60	Life Annuity with 60 payments guaranteed	136	2,819,832	29,911,877
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	49,165	120,305
A180	Life Annuity with 180 payments guaranteed	1,064	18,429,818	216,541,276
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	657,798	3,382,987
C180	100% Continued to Named Survivor with 180 payments guaranteed	2	12,680	172,832
LOL	Life with Optional Length Guaranteed	5	138,552	528,325
AC24	Annuity Certain with 24 Payments	0	13,790	17,694
AC60	Annuity Certain with 60 Payments	0	4,149	7,900
AC120	Annuity Certain with 120 Payments	0	26,979	201,506
A60WSS	Life with 60 Months Guaranteed and Social Security Integrated	7	6,218	24,499
PF6213	Police and Firemen s.62.13 *	1	31,412	80,514
Total Death-in-Service		1,480	\$ 26,420,442	\$ 297,235,412
<b>GRAND TOTAL</b>		<b>233,804</b>	<b>\$ 6,409,708,752</b>	<b>\$ 70,987,153,144</b>

<sup>(1)</sup> Includes 1,478 members formerly covered under the LTDI program.

In cases where an individual is receiving more than one annuity, the person only appears once in the above number counts, but the corresponding annual amounts can show up in several different places, depending on the option elected for the different annuities. This can result in, for example, a number count of zero (or a very low number count) combined with a significant annual dollar amount in the above table.

## \*Additional Information for Police and Firemen 62.13 Annuities

	Regular Retirement			Disability Retirement			Death-in-Service Retirement		
	Original	Dividends	Total	Original	Dividends	Total	Original	Dividends	Total
Benefit Amount	\$ 59,286	\$ 195,190	\$ 254,476	\$ 15,394	\$ 64,588	\$ 79,982	\$ 6,193	\$ 25,219	\$ 31,412
Present Value	193,445	662,961	856,406	80,611	338,232	418,843	15,873	64,641	80,514



## Core Annuities Being Paid Tabulated by Attained Ages

Attained Ages	Regular		Disability		Death-in-Service		Totals	
	No.	Annual Amount	No.	Annual Amount	No.	Annual Amount	No.	Annual Amount
Under 20	0	\$ 0	0	\$ 0	6	\$ 46,486	6	\$ 46,486
20-24	0	0	3	54,446	8	83,304	11	137,750
25-29	0	0	4	44,206	20	175,111	24	219,317
30-34	0	0	16	386,745	30	227,219	46	613,964
35-39	2	44,044	59	1,376,001	32	245,376	93	1,665,421
40-44	7	90,576	138	3,596,017	49	513,110	194	4,199,703
45-49	44	657,287	258	6,538,468	38	461,562	340	7,657,317
50-54	1,653	58,471,182	581	15,589,928	81	1,257,695	2,315	75,318,805
55-59	12,832	413,005,914	973	26,942,325	118	1,981,197	13,923	441,929,436
60-64	28,787	808,683,747	1,505	37,377,681	206	3,364,366	30,498	849,425,794
65-69	46,094	1,225,735,838	1,162	31,480,080	251	5,217,067	47,507	1,262,432,985
70-74	51,574	1,463,888,111	1,088	28,422,306	233	5,097,600	52,895	1,497,408,017
75-79	38,271	1,050,181,917	830	20,609,261	164	3,524,977	39,265	1,074,316,155
80-84	23,004	596,575,363	567	12,601,752	96	1,846,379	23,667	611,023,494
85-89	13,196	339,502,154	340	6,938,178	66	1,013,884	13,602	347,454,216
90-94	6,186	162,794,276	127	2,486,075	35	470,096	6,348	165,750,447
95 & Up	1,736	39,522,839	29	494,926	15	248,338	1,780	40,266,103
Certain Only*	1,258	29,192,748	0	3,919	32	646,675	1,290	29,843,342
<b>Totals</b>	<b>224,644</b>	<b>\$6,188,345,996</b>	<b>7,680</b>	<b>\$194,942,314</b>	<b>1,480</b>	<b>\$26,420,442</b>	<b>233,804</b>	<b>\$6,409,708,752</b>

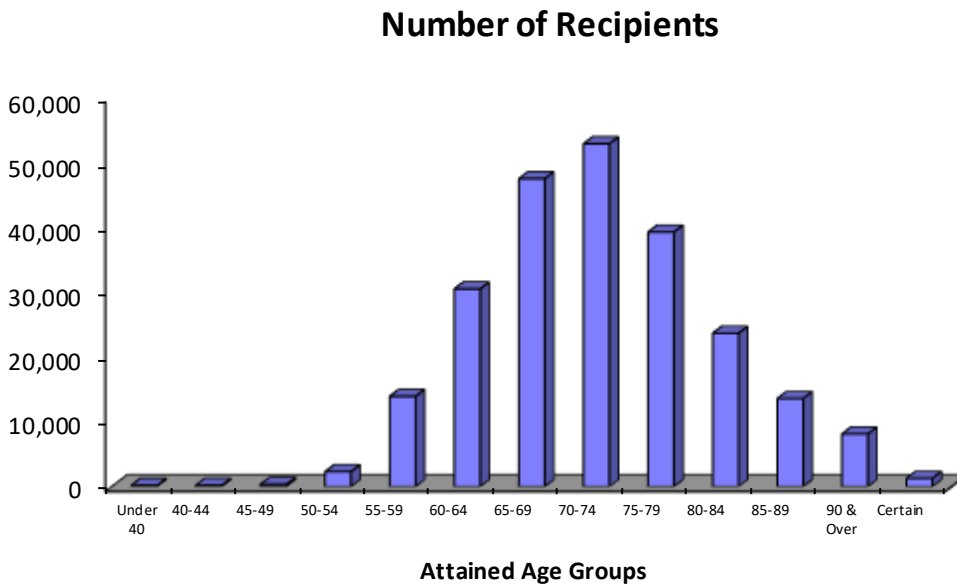
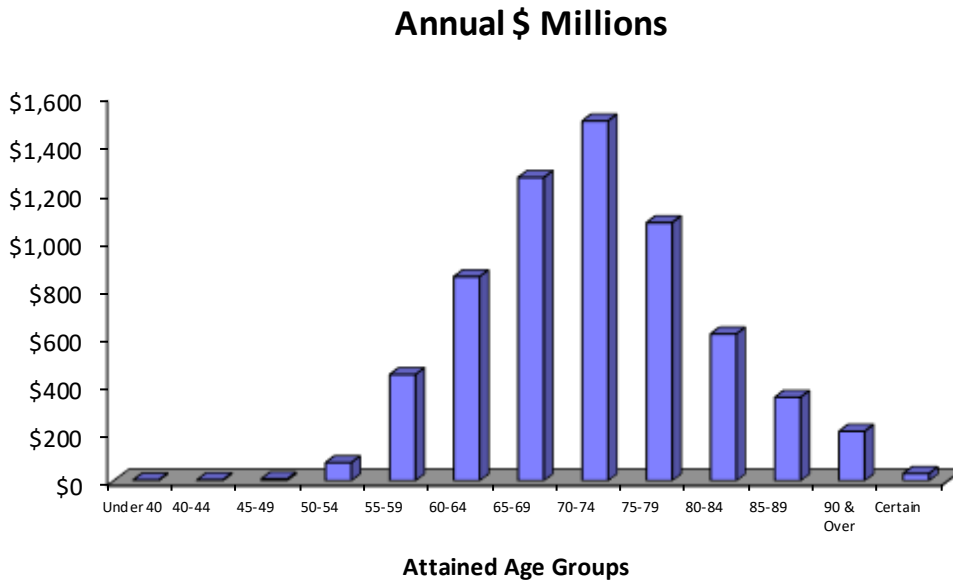
Averages in Years

Age at retirement	59.9	50.7	51.4	59.6
Attained age	71.6	65.0	67.6	71.4

\* Certain Only category consists of continuations of 5, 10 and 15-year certain and life annuities to beneficiaries of deceased annuitants.

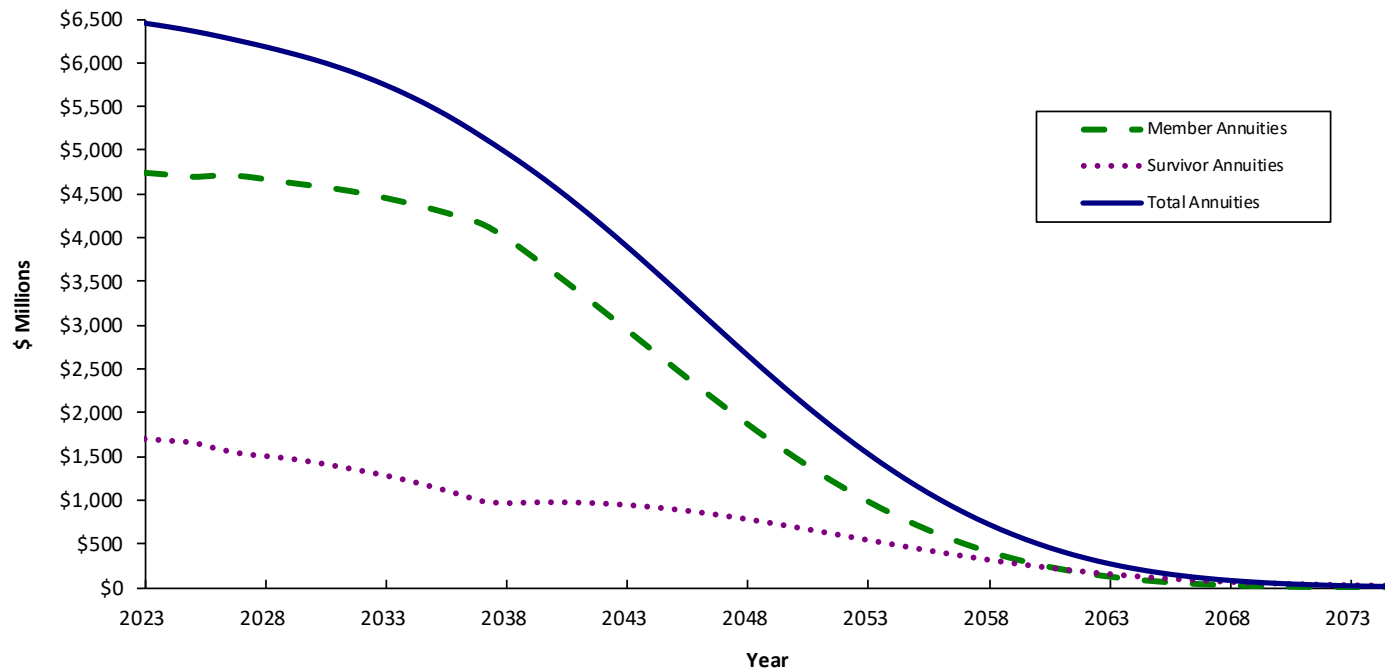


# Core Annuities Being Paid by Attained Age\*



\* Includes regular and disability retirees and survivor beneficiaries. The “certain” category includes annuities paid for a fixed period which is not dependent upon the age of the recipient.

## Projected Future Core Annuity Payments on Behalf of Present Retired Lives Including Present and Future Expected Dividends



	\$ Billions	
	<u>With Expected Dividends</u>	<u>Without Expected Dividends</u>
Total Future Benefit Payments	\$149.6	\$118.8
Present Assets	72.1	72.1
Future Investment Return Needed	77.5	46.7

Based upon the assumptions used in the valuation, future dividends are expected to be approximately 1.7% per year. Of course actual dividends will be based upon actual future investment return and the operation of the Market Recognition Account.

## SECTION D

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### VARIABLE ANNUITIES

## Variable Annuity Division Development of Assets and Liabilities

	\$ Millions		Ratio
	Assets	Liabilities	
<b>Ending Balance December 31, 2021</b>	\$5,618.0	\$4,866.0	1.155
Closing Adjustments	(2.8)	0.0	
Variable Terminations	(56.1)	(56.1)	
2022 Adjustment: 15%	0.0	712.9	
<b>Beginning Balance January 1, 2022</b>	5,559.1	5,522.8	1.007
<b>Increases</b>			
Reserve Transfers	369.6	369.6	
Regular Interest (5%)	271.4	271.4	
Additional Earnings	(1,238.0)	0.0	
Addition for Experience Study	0.0	0.0	
Other	0.0	0.0	
<b>Total Increases</b>	(597.0)	641.0	
<b>Decreases</b>			
Annuities & Lump Sums	559.1	559.1	
Credit Re-establishments	0.0	0.0	
Subtraction for Experience Study	0.0	0.0	
Other	0.0	18.2	
<b>Total Decreases</b>	559.1	577.3	
<b>Ending Balance December 31, 2022</b>	<b>\$4,403.0</b>	<b>\$5,586.5</b>	<b>0.788</b>

## Variable Fund Reserve Transfer Recommendation

Amounts to be transferred from the Employer Reserve and the Employee Reserve to the Annuity Reserve to cover liabilities for new annuities are computed as the first step in the annual actuarial valuation. The actuarial present value at time of retirement of variable annuities reported as new since the last actuarial valuation is \$354,718,025. Adjustments to prior transfers, relating to estimated annuities for which final computations have now been made, totaled \$14,896,244. Reserve transfers were distributed as follows:

Group	Regular Transfer	Adjustment to Prior Transfer	Total Transfer
General	\$314,515,237	\$12,863,533	\$327,378,770
Protective with Social Security	32,702,663	1,760,566	34,463,229
Protective without Social Security	4,823,017	213,111	5,036,128
Executive & Elected	2,677,108	59,034	2,736,142
<b>Totals</b>	<b>\$354,718,025</b>	<b>\$14,896,244</b>	<b>\$369,614,269</b>

Accordingly, we recommend that \$369,614,269 be transferred to the Variable Annuity Reserve. The results in this report assume that this transfer has been made.



## Discussion of Variable Annuity Change

Variable Annuity Reserves, \$4,403.0 million, were less than the actuarial present value of variable annuities, \$5,586.5 million, by \$1,183.5 million as of December 31, 2022 or 21.2% of the Actuarial Present Value (APV) of variable annuity payments. In accordance with Section 40.28(2) of the Wisconsin Statutes (see page 29 of this report), variable annuities will be decreased by 21.0% effective April 1, 2023. The primary sources of the 21.0% are as follows:

	<b>% of APV<sup>(1)</sup></b>
1. SWIB net of fee investment return	(17.8)%
2. Adjustment to published effective rate	(0.2)%
3. Published effective earnings rate	(18.0)%
4. Adjustment to relate earnings to average variable annuity fund balance	0.3%
5. Earnings rate based on average balance	(17.7)%
6. Expected change before adjustments: $(1-0.177)/1.05-1$	(21.6)%
7. Adjustment to relate average asset to ending liability	(0.6)%
8. Carryover from last year due to timing of distribution, accounting adjustments and truncation	0.6%
9. Experience study adjustment	0.0%
10. Experience and other effects	0.4%
11. Statutory adjustment: (truncate to whole percent)	0.2%
<b>12. Variable annuity change: (6)+(7)+(8)+(9)+(10)+(11)</b>	<b>(21.0)%</b>

<sup>(1)</sup> Actuarial Present Value

**Please see pages 30 and 31 for a description of the items on this page.**

In accordance with the Administrative Code, ETF 20.25 and Section 40.28(2) Wisconsin Statutes (shown on page 29 of this report), variable annuities will be decreased by 21.0% effective April 1, 2023.



# Transfers to Annuity Reserve to Finance Variable Annuities Approved in 2022 Tabulated by Type of Annuity and Option

Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
<b>REGULAR RETIREMENT</b>				
SL	Straight Life	293	\$ 2,898,011	\$ 40,502,081
SL	Straight Life (accelerated)	0	349,358	1,196,325
A60	Life Annuity with 60 payments guaranteed	132	0	0
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	0	0
A180	Life Annuity with 180 payments guaranteed	408	3,940,365	58,932,140
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	844,779	3,680,519
A180F	Life Annuity with 180 payments guaranteed (forced)	3	12,666	143,023
JOINT	Joint and 75% Survivor	192	2,583,557	39,052,765
JOINT	Joint and 75% Survivor (accelerated)	0	350,643	1,458,392
R25	Reduced 25% on First Death	88	996,391	15,310,834
R25	Reduced 25% on First Death (accelerated)	0	223,641	989,843
C100	100% Continued to Named Survivor	223	2,229,678	35,402,741
C100	100% Continued to Named Survivor (accelerated)	0	303,435	1,177,824
C180	100% Continued to Named Survivor with 180 payments guaranteed	660	7,591,205	120,945,671
C180	100% Continued to Named Survivor with 180 payments guaranteed (accelerated)	0	1,574,808	6,766,379
AC24	Annuity Certain with 24 Payments	1	0	0
AC60	Annuity Certain with 60 Payments	0	26,150	220,840
AC120	Annuity Certain with 120 Payments	0	45,061	353,294
AC180	Annuity Certain between 24 and 180 Payments	0	6,462	37,844
	Total Regular	2,000	\$ 23,976,210	\$ 326,170,515
	Average Age at Retirement	59.9 Years		
<b>DISABILITY RETIREMENT</b>				
SL	Straight Life	2	\$ 10,883	\$ 138,983
A60	Life Annuity with 60 payments guaranteed	1	1,341,758	19,133,918
A180	Life Annuity with 180 payments guaranteed	8	66,198	884,836
JOINT	Joint and 75% Survivor	3	31,422	472,553
R25	Reduced 25% on First Death	2	45,831	663,024
C100	100% Continued to Named Survivor	4	32,079	549,424
C180	100% Continued to Named Survivor with 180 payments guaranteed	25	231,515	3,756,839
AC24	Annuity Certain with 24 Payments	0	48,242	95,140
	Total Disability	45	\$ 1,807,928	\$ 25,694,717
	Average Age at Retirement	53.9 Years		
<b>DEATH-IN-SERVICE BENEFITS</b>				
SL	Straight Life	8	\$ 66,655	\$ 1,088,703
A60	Life Annuity with 60 payments guaranteed	0	13,828	164,302
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	208,575	860,654
A180	Life Annuity with 180 payments guaranteed	5	37,887	653,619
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	7,122	79,559
AC24	Annuity Certain with 24 Payments	0	1,162	5,956
	Total Death-in-Service	13	\$ 335,229	\$ 2,852,793
	Average Age at Retirement	46.9 Years		
<b>GRAND TOTAL</b>		<b>2,058</b>	<b>\$ 26,119,367</b>	<b>\$ 354,718,025</b>

*In cases where an individual is receiving more than one annuity, the person only appears once in the above number counts, but the corresponding annual amounts can show up in several different places, depending on the option elected for the different annuities. This can result in, for example, a number count of zero (or a very low number count) combined with a significant annual dollar amount in the above table.*



## Variable Annuities Being Paid Tabulated by Type of Annuity and Option

Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
<b>REGULAR RETIREMENT</b>				
SL	Straight Life	5,325	\$ 63,158,374	\$ 594,359,699
SL	Straight Life (accelerated)	0	1,226,632	3,067,552
A60	Life Annuity with 60 payments guaranteed	3,507	43,361,063	381,336,547
A60	Life Annuity with 60 payments guaranteed (accelerated)	0	685,159	1,721,997
A120	Life Annuity with 120 payments guaranteed	3	28,217	54,310
A180	Life Annuity with 180 payments guaranteed	8,259	93,127,898	887,997,683
A180	Life Annuity with 180 payments guaranteed (accelerated)	0	2,747,372	8,578,964
A180F	Life Annuity with 180 payments guaranteed (forced)	33	269,239	2,088,759
JOINT	Joint and 75% Survivor	4,959	77,939,697	757,981,028
JOINT	Joint and 75% Survivor (accelerated)	0	1,239,421	3,310,431
R25	Reduced 25% on First Death	3,136	64,151,841	505,804,741
R25	Reduced 25% on First Death (accelerated)	0	656,059	2,061,441
C100	100% Continued to Named Survivor	4,085	55,674,338	566,836,203
C100	100% Continued to Named Survivor (accelerated)	0	1,145,356	3,348,358
C180	100% Continued to Named Survivor with 180 payments guaranteed	11,896	152,294,607	1,701,667,092
C180	100% Continued to Named Survivor with 180 payments guaranteed (accelerated)	0	4,729,865	14,366,213
LOL	Life with Optional Length Guaranteed	3	67,288	146,824
AC24	Annuity Certain with 24 Payments	1	52,185	93,364
AC60	Annuity Certain with 60 Payments	2	35,318	110,012
AC120	Annuity Certain with 120 Payments	2	158,451	792,297
AC180	Annuity Certain between 24 and 180 Payments	1	388,115	1,118,971
C50	50% Continued to One Beneficiary	5	76,884	240,662
C50W180	50% Continued to One Beneficiary with 180 Months guaranteed	1	10,162	23,900
C75WSS	75% Continued to One Beneficiary and Social Security Integrated	6	63,895	264,543
A60WSS	Life with 60 Months Guaranteed and Social Security Integrated	3	15,049	30,805
A180WSS	Life with 180 Months Guaranteed and Social Security Integrated	2	15,363	36,842
SLNSD	Straight Life - Named Survivor Deceased	147	2,055,833	17,311,226
	Total Regular	41,376	\$565,373,681	\$5,454,750,464

(concluded on next page)

*In cases where an individual is receiving more than one annuity, the person only appears once in the above number counts, but the corresponding annual amounts can show up in several different places, depending on the option elected for the different annuities. This can result in, for example, a number count of zero (or a very low number count) combined with a significant annual dollar amount in the above table.*



## Variable Annuities Being Paid Tabulated by Type of Annuity and Option

Numeric Code	Alpha Code	Type of Benefit	Number	Annual Amount	Present Value
<b>DISABILITY RETIREMENT</b>					
1	SL	Straight Life	127	\$ 963,019	\$ 9,032,142
3	A60	Life Annuity with 60 payments guaranteed	67	629,248	5,174,091
7	A180	Life Annuity with 180 payments guaranteed	247	1,593,264	16,016,611
10	JOINT	Joint and 75% Survivor	103	1,158,517	11,104,775
12	R25	Reduced 25% on First Death	42	366,218	3,362,058
14	C100	100% Continued to Named Survivor	197	1,613,845	14,652,860
16	C180	100% Continued to Named Survivor with 180 payments guaranteed	480	3,636,810	40,987,145
		Total Disability	1,263	\$ 9,960,921	\$ 100,329,682
<b>DEATH-IN-SERVICE BENEFITS</b>					
1	SL	Straight Life	74	\$ 730,852	\$ 7,329,823
2	SL	Straight Life (accelerated)	0	7,843	34,046
3	A60	Life Annuity with 60 payments guaranteed	29	307,299	2,289,042
7	A180	Life Annuity with 180 payments guaranteed	262	1,971,273	20,988,365
8	A180	Life Annuity with 180 payments guaranteed (accelerated)	0	89,419	476,794
22	AC120	Annuity Certain with 120 Payments	0	45,061	336,217
28	A60WSS	Life with 60 Months Guaranteed and Social Security Integrated	3	3,408	11,273
		Total Death-in-Service	368	\$ 3,155,155	\$ 31,465,560
<b>GRAND TOTAL</b>			<b>43,007</b>	<b>\$ 578,489,757</b>	<b>\$ 5,586,545,706</b>

*In cases where an individual is receiving more than one annuity, the person only appears once in the above number counts, but the corresponding annual amounts can show up in several different places, depending on the option elected for the different annuities. This can result in, for example, a number count of zero (or a very low number count) combined with a significant annual dollar amount in the above table.*



## Variable Annuities Being Paid Tabulated by Attained Ages

Attained Ages	Regular		Disability		Death-in-Service		Totals	
	No.	Annual Amount	No.	Annual Amount	No.	Annual Amount	No.	Annual Amount
Under 20	0	\$ 0	0	\$ 0	0	\$ 0	0	\$ 0
20-24	0	0	1	1,677	1	939	2	2,616
25-29	0	0	2	2,870	7	12,689	9	15,559
30-34	0	0	5	16,323	3	3,869	8	20,192
35-39	0	0	10	31,119	5	3,084	15	34,203
40-44	3	11,070	23	118,369	12	44,812	38	174,251
45-49	18	165,973	27	184,544	12	79,106	57	429,623
50-54	375	3,647,969	77	524,060	27	196,217	479	4,368,246
55-59	2,807	31,674,616	145	924,016	27	180,045	2,979	32,778,677
60-64	4,966	44,098,883	189	1,062,006	60	395,072	5,215	45,555,961
65-69	7,651	60,655,026	236	1,092,502	46	337,724	7,933	62,085,252
70-74	9,229	94,523,602	187	1,342,837	59	309,805	9,475	96,176,244
75-79	7,646	126,596,353	155	1,959,751	42	568,256	7,843	129,124,360
80-84	4,078	93,293,610	105	1,523,190	26	453,131	4,209	95,269,931
85-89	2,556	65,366,570	69	835,626	16	164,770	2,641	66,366,966
90-94	1,371	33,491,875	25	286,332	11	211,114	1,407	33,989,321
95 & Up	449	9,945,525	7	55,699	10	137,858	466	10,139,082
Certain Only*	227	1,902,609	0	0	4	56,664	231	1,959,273
<b>Totals</b>	<b>41,376</b>	<b>\$565,373,681</b>	<b>1,263</b>	<b>\$9,960,921</b>	<b>368</b>	<b>\$3,155,155</b>	<b>43,007</b>	<b>\$578,489,757</b>

Averages in Years

Age at retirement	59.2	52.6	51.8	59.0
Attained age	71.6	66.5	67.6	71.4

\* Certain only category consists of continuations of 5, 10 and 15-year certain and life annuities to beneficiaries of deceased annuitants.



## **SECTION E**

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### **COMPARATIVE STATEMENTS**

# Core Annuities Comparative Statement 1988 Through 2022

Valuation Date	Number	\$ Millions				Change in		
		Annual	Fund	Actuarial	Ratio	Annuities		CPI*
		Annuities	Balance	Reserve		Average	Maximum	
1988	70,017	\$ 420.6	\$ 4,319.6	\$ 4,150.9	1.041	4.1 %		4.4 %
1989	73,232	488.7	5,487.4	4,928.1	1.113	11.3 %		4.6 %
1990	77,666	611.3	6,443.8	6,219.1	1.036	3.6 %		6.2 %
1991	79,465	660.4	7,137.8	6,711.3	1.063	6.3 %		3.0 %
1992	81,508	732.3	7,782.4	7,456.6	1.044	4.4 %		3.0 %
1993	83,836	801.7	8,608.2	8,205.3	1.049	4.9 %		2.7 %
1994	86,214	882.2	9,286.2	9,029.6	1.028	2.8 %		2.7 %
1995	88,998	955.8	10,351.7	9,804.1	1.056	5.6 %		2.6 %
1996	92,198	1,065.8	11,699.8	10,977.1	1.066	6.6 %		3.3 %
1997	95,128	1,188.4	13,185.1	12,240.4	1.077	7.7 %		1.7 %
1998	99,112	1,349.5	14,951.8	13,943.0	1.072	7.2 %		1.6 %
1999	102,817	1,513.8	16,857.8	15,687.2	1.075	17.1 %	**	2.7 %
2000	107,425	1,867.0	20,517.8	19,405.3	1.057	5.7 %		3.4 %
2001	112,142	2,048.6	21,979.7	21,283.6	1.033	3.3 %		1.6 %
2002	116,289	2,226.6	23,142.4	23,202.9	0.997	0.0 %		2.4 %
2003	121,582	2,364.7	25,071.9	24,724.0	1.014	1.4 %		1.9 %
2004	126,211	2,500.3	26,920.0	26,232.2	1.026	2.6 %		3.3 %
2005	131,674	2,691.4	28,575.3	28,359.7	1.008	0.8 %		3.4 %
2006	137,117	2,843.6	31,180.5	30,273.9	1.030	3.0 %		2.6 %
2007	142,906	3,075.3	35,050.1	32,877.5	1.066	6.6 %		4.1 %
2008	144,033	3,399.3	35,798.1	36,551.5	0.979	(2.1)%	(2.1)%	0.1 %
2009	150,671	3,449.3	36,655.8	37,072.7	0.989	(1.1)%	(1.3)%	2.7 %
2010	155,775	3,532.4	37,798.4	38,148.5	0.991	(0.9)%	(1.2)%	1.5 %
2011	167,453	3,842.0	40,411.5	42,078.3	0.960	(4.0)%	(7.0)%	3.0 %
2012	173,655	3,806.3	40,591.6	41,852.4	0.970	(3.0)%	(9.6)%	1.7 %
2013	180,056	3,800.7	44,273.2	42,300.5	1.047	4.7 %		1.5 %
2014	185,605	4,102.3	47,135.7	45,790.7	1.029	2.9 %		0.8 %
2015	191,795	4,364.9	49,147.0	48,897.5	1.005	0.5 %		0.7 %
2016	197,647	4,523.1	51,972.0	50,941.4	1.020	2.0 %		2.1 %
2017	203,202	4,747.0	54,900.0	53,590.0	1.024	2.4 %		2.1 %
2018	211,126	5,040.9	56,493.8	56,629.3	0.998	0.0 %		1.9 %
2019	216,944	5,183.7	59,138.4	58,157.0	1.017	1.7 %		2.3 %
2020	222,723	5,423.2	63,805.8	60,691.1	1.051	5.1 %		1.4 %
2021	228,161	5,842.6	69,910.7	65,085.4	1.074	7.4 %		7.0 %
2022	233,804	6,409.7	72,108.4	70,987.2	1.016	1.6 %		6.5 %
<b>35-Year Average</b>						<b>3.4 %</b>		<b>2.7 %</b>
<b>20-Year Average</b>						<b>1.5 %</b>		<b>2.5 %</b>
<b>10-Year Average</b>						<b>2.8 %</b>		<b>2.6 %</b>
<b>5-Year Average</b>						<b>3.1 %</b>		<b>3.8 %</b>

\* CPI percentage increase determined by ratio of current year CPI-U67 December index over prior year December index.

\*\* Including 10.6% Act 11 transfer.

In cases where there is a negative dividend, a maximum decrease is calculated to account for annuitants that are already at the floor and whose dividend cannot be reduced.



# Variable Annuities Comparative Statement 1988 Through 2022

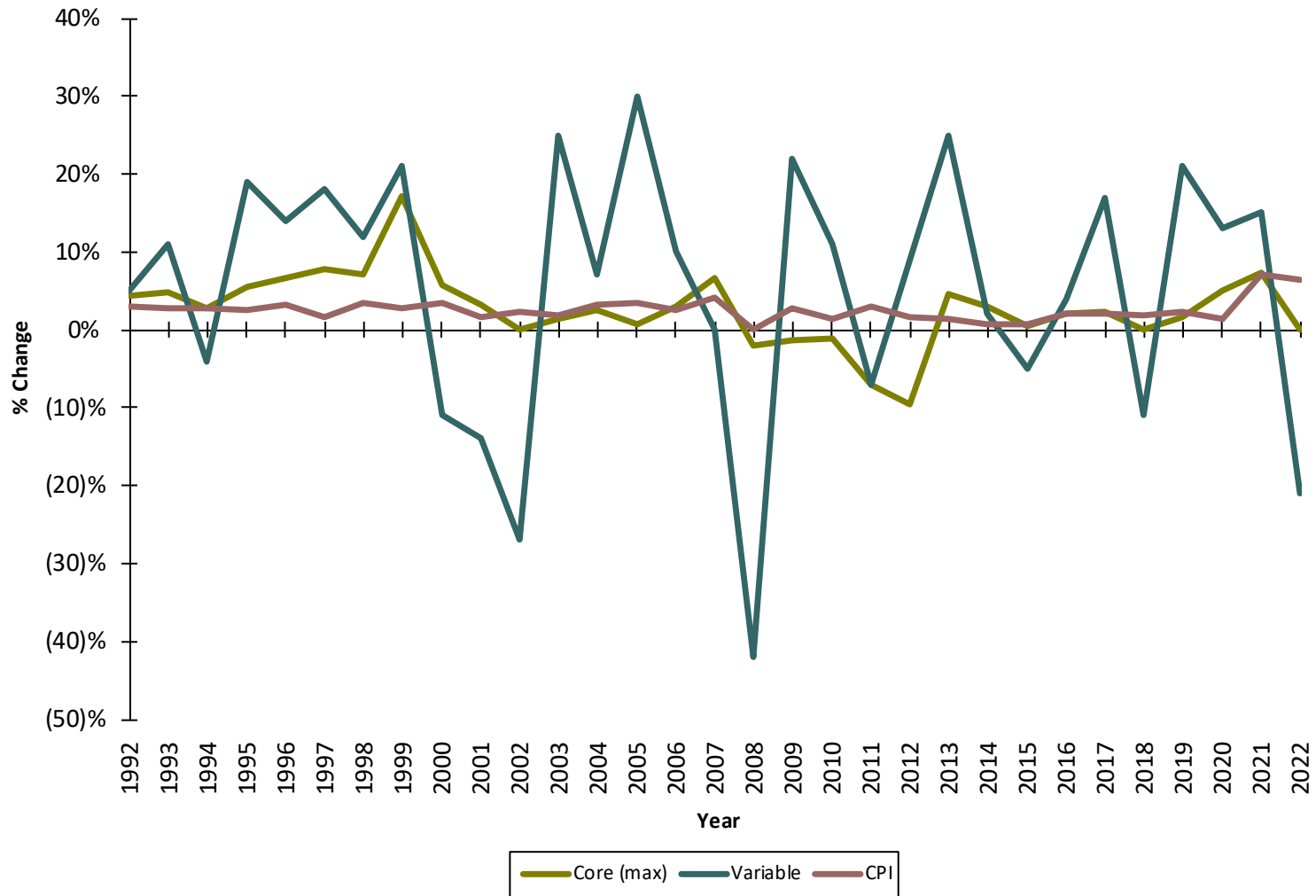
Valuation Date	Number	\$ Millions				Change in	
		Annual Annuities	Fund Balance	Actuarial Reserve	Ratio	Annuities	CPI*
1988	17,779	\$ 61.4	\$ 682.6	\$ 594.0	1.149	14.0 %	4.4 %
1989	18,502	75.9	878.1	756.5	1.161	16.0 %	4.6 %
1990	19,922	101.0	868.6	1,013.4	0.857	(14.0)%	6.2 %
1991	20,538	91.5	1,101.3	929.7	1.184	18.0 %	3.0 %
1992	20,968	112.6	1,208.6	1,147.4	1.053	5.0 %	3.0 %
1993	21,623	123.7	1,407.9	1,268.6	1.110	11.0 %	2.7 %
1994	22,248	144.6	1,418.0	1,487.0	0.954	(4.0)%	2.7 %
1995	22,978	150.2	1,854.2	1,556.0	1.192	19.0 %	2.6 %
1996	23,725	189.8	2,264.9	1,976.7	1.146	14.0 %	3.3 %
1997	24,462	228.2	2,800.0	2,371.5	1.181	18.0 %	1.7 %
1998	25,424	289.5	3,400.5	3,035.5	1.120	12.0 %	1.6 %
1999	26,257	345.8	4,432.9	3,659.1	1.212	21.0 %	2.7 %
2000	27,321	445.3	4,211.4	4,749.3	0.887	(11.0)%	3.4 %
2001	28,314	424.4	3,901.8	4,547.4	0.858	(14.0)%	1.6 %
2002	28,662	374.0	2,899.3	3,999.1	0.726	(27.0)%	2.4 %
2003	29,496	273.3	3,635.9	2,892.2	1.257	25.0 %	1.9 %
2004	30,270	346.0	3,909.9	3,654.5	1.070	7.0 %	3.3 %
2005	31,499	376.5	4,092.7	3,970.7	1.031	3.0 %	3.4 %
2006	32,683	391.8	4,594.2	4,145.2	1.108	10.0 %	2.6 %
2007	33,880	432.6	4,625.0	4,563.7	1.013	0.0 %	4.1 %
2008	34,927	427.0	2,574.5	4,491.0	0.573	(42.0)%	0.1 %
2009	34,836	240.3	3,078.4	2,512.7	1.225	22.0 %	2.7 %
2010	35,866	288.4	3,340.6	3,005.4	1.111	11.0 %	1.5 %
2011	38,949	330.3	3,197.9	3,462.9	0.924	(7.0)%	3.0 %
2012	39,873	304.6	3,463.9	3,169.6	1.093	9.0 %	1.7 %
2013	40,317	324.5	4,187.3	3,347.0	1.251	25.0 %	1.5 %
2014	39,420	386.5	3,995.4	3,917.1	1.020	2.0 %	0.8 %
2015	40,152	387.8	3,704.8	3,910.1	0.947	(5.0)%	0.7 %
2016	40,647	363.6	3,792.0	3,645.1	1.040	4.0 %	2.1 %
2017	40,877	369.9	4,324.9	3,682.1	1.175	17.0 %	2.1 %
2018	41,187	425.8	3,738.6	4,207.6	0.891	(10.0)%	1.9 %
2019	41,777	379.7	4,519.4	3,728.6	1.212	21.0 %	2.3 %
2020	41,753	449.7	4,954.0	4,383.0	1.130	13.0 %	1.4 %
2021	42,251	502.6	5,618.0	4,866.0	1.155	15.0 %	7.0 %
2022	43,007	578.5	4,403.0	5,586.5	0.788	(21.0)%	6.5 %
<b>35-Year Average</b>						<b>3.7 %</b>	<b>2.7 %</b>
<b>20-Year Average</b>						<b>3.5 %</b>	<b>2.5 %</b>
<b>10-Year Average</b>						<b>5.1 %</b>	<b>2.6 %</b>
<b>5-Year Average</b>						<b>2.3 %</b>	<b>3.8 %</b>

\* CPI percentage increase determined by ratio of current year CPI-U67 December index over prior year December index.

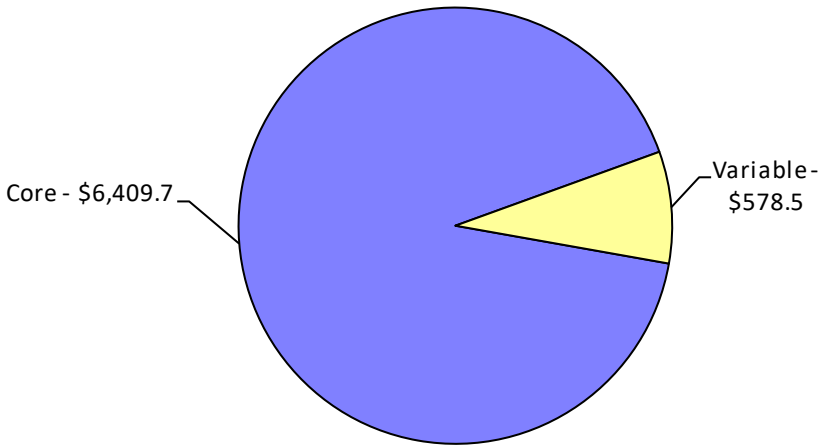
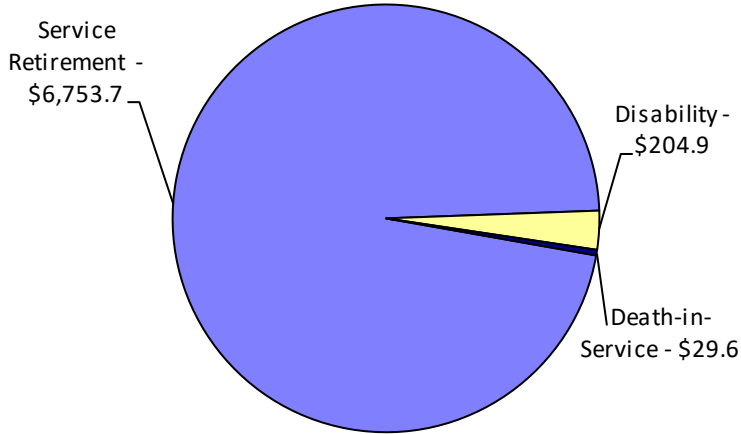




## History of % Changes in Annuities and CPI



# Annual Annuities Being Paid by Type \$ Millions



## Annuities Being Paid Tabulated by Year of Retirement<sup>(1)</sup> (\$1,000s annually)

Year Ret'd <sup>(2)</sup>	Core Annuities				Variable Annuities				Avg. Total Annuity
	No.	Initial	Increases	Total	No.	Initial	Increases	Total	
2022	10,456	\$ 289,070	\$ 0	\$ 289,070	1,996	\$ 24,915	\$ 0	\$ 24,915	\$33,693
2021	10,644	290,739	11,426	302,165	1,690	17,526	2,628	20,154	33,575
2020	10,709	274,305	28,349	302,654	1,541	13,931	4,172	18,103	32,548
2019	10,286	256,096	35,625	291,721	1,541	10,293	5,891	16,184	32,521
2018	10,089	251,274	37,114	288,388	1,485	11,453	4,753	16,206	32,847
2017	9,684	230,673	37,221	267,894	1,447	8,114	5,321	13,435	31,731
2016	9,991	232,824	43,090	275,914	1,515	8,264	5,966	14,230	31,783
2015	10,071	229,283	45,725	275,008	1,625	8,673	5,515	14,188	31,878
2014	9,112	194,034	42,614	236,648	1,645	8,522	5,698	14,220	30,030
2013	9,425	194,258	51,467	245,725	1,623	6,609	7,176	13,785	30,120
2012	9,291	194,031	56,774	250,805	1,649	5,748	7,319	13,067	31,161
2011	14,816	368,578	108,652	477,230	2,992	13,761	15,333	29,094	37,890
2010	8,066	183,429	53,860	237,289	1,538	5,264	7,090	12,354	33,956
2009	7,547	173,625	51,130	224,755	1,351	3,776	7,036	10,812	34,210
2008	8,138	189,627	55,843	245,470	1,576	9,238	6,115	15,353	32,820
2007	7,768	171,535	50,421	221,956	1,693	10,334	6,836	17,170	30,963
2006	7,440	154,910	45,646	200,556	1,576	10,298	8,513	18,811	29,568
2005	7,372	150,942	44,472	195,414	1,558	10,593	9,341	19,934	29,319
2004	6,509	126,199	37,277	163,476	1,451	10,217	10,353	20,570	28,398
2003	6,409	124,756	36,869	161,625	1,326	8,374	12,699	21,073	28,609
2002	5,926	112,362	33,185	145,547	1,153	11,058	9,268	20,326	28,105
2001	5,955	112,214	33,093	145,307	1,209	17,550	10,177	27,727	29,243
2000	5,760	108,090	31,957	140,047	991	19,701	8,002	27,703	29,358
1999	4,704	76,263	35,590	111,853	811	12,592	8,831	21,423	28,459
1998	4,412	67,966	38,165	106,131	810	11,186	10,129	21,315	29,150
1997	3,510	52,928	35,582	88,510	650	7,598	9,481	17,079	30,385
1996	3,287	48,771	38,489	87,260	674	6,880	10,729	17,609	32,277
1995	2,779	39,559	35,063	74,622	562	4,656	9,556	14,212	32,409
1994	2,367	32,100	31,038	63,138	537	4,363	8,416	12,779	32,709
1993	2,033	26,303	27,076	53,379	447	3,039	6,824	9,863	31,557
1992	1,599	19,031	21,678	40,709	359	2,344	5,655	7,999	30,927
1991	1,296	15,001	18,849	33,850	320	1,736	5,255	6,991	32,286
1990	2,016	24,685	33,231	57,916	509	3,050	7,517	10,567	34,798
1989	1,322	15,869	24,109	39,978	321	1,702	5,132	6,834	36,008
1988	776	6,880	11,965	18,845	207	819	2,933	3,752	29,695
1987	579	4,590	8,509	13,099	145	469	1,554	2,023	27,052
1986	462	3,742	8,091	11,833	143	507	1,851	2,358	32,107
1985	388	3,012	7,095	10,107	99	240	1,166	1,406	30,376
1984	244	1,699	4,465	6,164	77	225	1,092	1,317	32,107
1983	146	657	1,816	2,473	55	99	569	668	21,964
Prior	420	1,179	3,999	5,178	110	99	782	881	8,522
<b>Total</b>	<b>233,804</b>	<b>\$5,053,089</b>	<b>\$1,356,620</b>	<b>\$6,409,709</b>	<b>43,007</b>	<b>\$315,816</b>	<b>\$262,674</b>	<b>\$578,490</b>	<b>\$29,889</b>

<sup>(1)</sup> Includes 1,478 members formerly covered under the LTDI program based on year of termination.

<sup>(2)</sup> The number of retirements during 2022 may not match the number of new retirees on page 8 of this report due to a reporting lag.

As of December 31, 2022, the median annual Core benefit is approximately \$23,000, the median annual Variable benefit is approximately \$8,100 and the median combined benefit is \$25,500.



## Liabilities as of December 31, 2022 Tabulated by Year of Retirement<sup>(1)</sup> (\$1,000s)

Year Ret'd <sup>(2)</sup>	Core Liabilities				Variable Liabilities				Total Liabilities
	No.	Initial	Increases	Total	No.	Initial	Increases	Total	
2022	10,456	\$ 3,930,387	\$ 0	\$ 3,930,387	1,996	\$ 338,761	\$ 0	\$ 338,761	\$ 4,269,148
2021	10,644	3,877,553	152,285	4,029,838	1,690	232,612	34,883	267,495	4,297,332
2020	10,709	3,639,142	376,015	4,015,157	1,541	177,699	53,221	230,920	4,246,077
2019	10,286	3,370,372	468,762	3,839,134	1,541	132,403	75,784	208,187	4,047,322
2018	10,089	3,272,318	483,381	3,755,698	1,485	140,596	58,351	198,947	3,954,646
2017	9,684	2,962,017	480,863	3,442,880	1,447	102,930	67,495	170,425	3,613,306
2016	9,991	2,954,854	551,690	3,506,544	1,515	101,641	73,383	175,025	3,681,568
2015	10,071	2,909,773	584,925	3,494,698	1,625	107,563	68,398	175,961	3,670,660
2014	9,112	2,406,586	533,861	2,940,446	1,645	102,986	68,855	171,841	3,112,287
2013	9,425	2,371,910	634,806	3,006,716	1,623	79,144	85,938	165,082	3,171,798
2012	9,291	2,327,954	687,556	3,015,509	1,649	68,054	86,648	154,702	3,170,211
2011	14,816	4,343,634	1,284,808	5,628,443	2,992	154,655	172,320	326,975	5,955,417
2010	8,066	2,081,217	614,209	2,695,426	1,538	58,065	78,197	136,263	2,831,689
2009	7,547	1,925,062	569,642	2,494,704	1,351	40,021	74,580	114,601	2,609,305
2008	8,138	2,048,003	604,842	2,652,845	1,576	96,152	63,571	159,723	2,812,568
2007	7,768	1,845,530	544,172	2,389,702	1,693	107,700	71,233	178,933	2,568,635
2006	7,440	1,625,709	480,447	2,106,156	1,576	105,149	86,928	192,077	2,298,233
2005	7,372	1,533,307	452,729	1,986,036	1,558	104,762	92,380	197,142	2,183,178
2004	6,509	1,235,818	365,407	1,601,224	1,451	99,077	100,393	199,471	1,800,695
2003	6,409	1,185,984	350,804	1,536,789	1,326	79,847	121,090	200,937	1,737,726
2002	5,926	1,030,403	304,482	1,334,885	1,153	103,181	86,488	189,669	1,524,554
2001	5,955	975,706	287,795	1,263,501	1,209	149,414	86,642	236,056	1,499,557
2000	5,760	897,129	265,230	1,162,359	991	162,922	66,178	229,100	1,391,460
1999	4,704	605,714	281,582	887,296	811	98,670	69,189	167,859	1,055,155
1998	4,412	511,369	286,988	798,357	810	81,220	73,548	154,768	953,125
1997	3,510	375,005	251,450	626,455	650	53,331	66,552	119,883	746,338
1996	3,287	326,661	257,124	583,785	674	44,007	68,631	112,638	696,423
1995	2,779	250,154	221,670	471,823	562	28,609	58,711	87,320	559,144
1994	2,367	189,958	183,590	373,548	537	25,337	48,882	74,219	447,767
1993	2,033	147,881	152,541	300,421	447	16,287	36,549	52,836	353,258
1992	1,599	100,458	114,765	215,223	359	11,770	28,385	40,154	255,378
1991	1,296	75,063	94,303	169,366	320	8,182	24,767	32,949	202,315
1990	2,016	120,730	162,725	283,455	509	14,463	35,645	50,108	333,564
1989	1,322	71,120	108,252	179,373	321	7,255	21,877	29,131	208,504
1988	776	30,000	52,269	82,269	207	3,343	11,958	15,301	97,570
1987	579	18,631	34,651	53,282	145	1,832	6,071	7,903	61,186
1986	462	14,280	30,990	45,270	143	1,868	6,813	8,681	53,951
1985	388	11,236	26,705	37,942	99	886	4,306	5,193	43,134
1984	244	5,815	15,367	21,182	77	714	3,469	4,183	25,365
1983	146	2,252	6,271	8,524	55	328	1,879	2,207	10,731
Prior	420	4,637	15,867	20,504	110	328	2,590	2,919	23,422
<b>Total</b>	<b>233,804</b>	<b>\$57,611,334</b>	<b>\$13,375,819</b>	<b>\$70,987,153</b>	<b>43,007</b>	<b>\$3,243,765</b>	<b>\$2,342,781</b>	<b>\$5,586,546</b>	<b>\$76,573,700</b>

<sup>(1)</sup> Includes 1,478 members formerly covered under the LTDI program based on year of termination.

<sup>(2)</sup> The number of retirements during 2022 may not match the number of new retirees on page 8 of this report due to reporting lag.



## Comparison of Actual to Expected Deaths Among Retired Lives (Normal Retirement Only) During 2022

Age	Male Deaths			Female Deaths			Total Deaths		
	Actual	Expected	Exposure	Actual	Expected	Exposure	Actual	Expected	Exposure
30-34									
35-39						2			2
40-44			1			8			9
45-49			23			47			70
50-54	2	2	1,153	1		614	3	2	1,767
55-59	27	18	5,552	14	20	7,075	41	38	12,627
60-64	80	56	10,884	84	74	17,647	164	130	28,531
65-69	173	152	17,476	167	192	29,169	340	344	46,645
70-74	337	325	20,319	316	371	31,680	653	696	51,999
75-79	483	466	15,708	481	482	21,865	964	948	37,573
80-84	511	517	9,270	575	570	13,351	1,086	1,087	22,621
85-89	578	548	5,291	715	673	8,413	1,293	1,221	13,704
90-94	400	406	2,253	645	635	4,350	1,045	1,041	6,603
95-99	134	133	469	369	324	1,337	503	457	1,806
100 & Up	24	18	45	88	78	214	112	96	259
<b>Totals</b>	<b>2,749</b>	<b>2,641</b>	<b>88,444</b>	<b>3,455</b>	<b>3,419</b>	<b>135,772</b>	<b>6,204</b>	<b>6,060</b>	<b>224,216</b>
<b>Prior Year</b>									
<b>Totals</b>	<b>2,788</b>	<b>2,564</b>	<b>86,792</b>	<b>3,208</b>	<b>3,273</b>	<b>131,585</b>	<b>5,996</b>	<b>5,837</b>	<b>218,377</b>
Average									
Ages	81.5	81.9	72.1	84.0	83.5	72.4	82.9	82.8	72.3



## **SECTION F**

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### **APPENDIX**

## Actuarial Assumptions Used in the Retired Life Actuarial Valuation

The interest rate used in the valuation was 5.0% per year, compounded yearly, as provided in Section 40.02 of the Wisconsin Statutes. The liability for current dividends was calculated assuming those dividends would always be paid. However, continued payment of those dividends is not guaranteed. Unfavorable investment performance or other factors could cause all or a portion of those dividends to be rolled back. If that happened, liabilities would be lower than reported in this valuation. The mortality table used in the valuation was the 2020 WRS Experience Table, as adopted by the Board in connection with the 2018-2020 Experience Study. This table includes margin for future improvements in mortality by incorporating 100% of the MP-2021 fully generational mortality projection scale. The impact of the new mortality tables was minor, so the new tables were fully recognized in the 2021 valuation.

### Single Life Retirement Values 2020 WRS Experience Table – with 5% Interest

Sample Attained Ages in 2022	Present Value of \$1 Monthly for Life		Future Life Expectancy (years)		Probability of Death Next Year	
	Males	Females	Males	Females	Males	Females
40	\$216.63	\$218.33	47.1	49.2	0.064%	0.043%
45	208.66	210.84	41.9	44.0	0.082%	0.054%
50	198.55	201.39	36.7	38.7	0.122%	0.087%
55	186.05	189.92	31.6	33.6	0.244%	0.225%
60	171.19	176.52	26.7	28.7	0.419%	0.350%
65	153.77	160.33	22.0	23.9	0.681%	0.498%
70	133.63	141.00	17.5	19.3	1.130%	0.791%
75	111.11	118.95	13.4	14.9	2.060%	1.508%
80	87.53	95.51	9.7	11.0	3.936%	3.023%
85	64.98	72.55	6.7	7.7	7.585%	5.947%

The values shown above are for non-disabled participants. Sample values for disabled participants are as follows:

Sample Attained Ages in 2022	Present Value of \$1 Monthly for Life		Future Life Expectancy (years)		Probability of Death Next Year	
	Males	Females	Males	Females	Males	Females
40	\$175.46	\$179.07	32.2	35.0	0.982%	0.868%
45	164.89	168.63	28.2	30.9	1.232%	1.118%
50	153.34	158.46	24.5	27.1	1.721%	1.589%
55	141.56	149.03	21.2	23.7	2.309%	2.027%
60	129.85	139.03	18.2	20.6	2.941%	2.384%
65	117.89	126.77	15.4	17.5	3.502%	2.520%
70	104.54	111.48	12.8	14.4	4.120%	2.940%
75	88.93	94.02	10.2	11.2	5.266%	4.132%
80	72.07	76.09	7.8	8.4	7.521%	6.443%
85	56.01	59.73	5.7	6.2	11.337%	10.304%



## Statutory Provisions – Post-Retirement Adjustments

### Core Annuities – 40.27(2)

“CORE ANNUITY RESERVE SURPLUS DISTRIBUTIONS. Surpluses in the core annuity reserve established under s. 40.04 (6) and (7) shall be distributed by the board if the distribution will result in at least a 0.5% increase in the amount of annuities in force, except as otherwise provided by the department by rule, on recommendation of the actuary, as follows:

(a) The distributions shall be expressed as percentage increases in the amount of the monthly annuity in force, including prior distributions of surpluses but not including any amount paid from funds other than the core annuity reserve fund, preceding the effective date of the distribution. For purposes of this subsection, annuities in force include any disability annuity suspended because the earnings limitation had been exceeded by that annuitant in that year.

(b) Prorated percentages based on the annuity effective date may be applied to annuities with effective dates during the calendar year preceding the effective date of the distribution, as provided by rule, but no other distinction may be made among the various types of annuities payable from the core annuity reserve.

(c) The distributions shall not be offset against any other benefit being received but shall be paid in full, nor shall any other benefit being received be reduced by the distributions. The annuity reserve surplus distributions authorized under this subsection may be revoked by the board in part or in total as to future payments upon recommendation of the actuary if a deficit occurs in the core annuity reserves and such deficit would result in a 0.5 percent or greater decrease in the amount of annuities in force, except as otherwise provided by the department by rule.

(d) Notwithstanding s 40.03 (2) (i), (7) (d), and (8) (d), the department may promulgate rules under this subsection without the approval of the teachers retirement board and the Wisconsin retirement board.”

### Variable Annuities – 40.28(2)

“Whenever the balance in the variable annuity reserve, as of December 31 of any year, exceeds or is less than the then present value of all variable annuities in force, determined in accordance with the rate of interest and approved actuarial tables then in effect, by at least 2% of the present value of all variable annuities in force, the amount of each variable annuity payment shall be proportionately increased or decreased, disregarding fractional percentages, and effective on a date determined by rule, so as to reduce the variance between the balance of the variable annuity reserve and the present value of variable annuities to less than one percent.”



# Narrative Regarding the Development of Core and Variable Annuity Adjustments Shown on Pages 6 and 16

- 1. SWIB Net of Fee Investment Return**  
State of Wisconsin Investment Board net earnings rate on the Core/Variable Fund.
- 2. MRA Adjustment (Core)/Adjustment to Published Effective Rate (Variable)**  
Item 3 below minus Item 1 above. For core annuities, this is the MRA adjustment which takes into account five-year smoothing of gains and losses.
- 3. Published Effective Earnings Rate**  
The earnings rate published by DETF is funds' earnings credits expressed as a percentage of the beginning year balance adjusted for benefit payments and reserve transfers.
- 4. Adjustment to Relate Earnings to Average Core/Variable Annuity Balance**  
Item 5 below minus Item 3 above.
- 5. Earnings Rate Based on Average Balance**  
This is similar to the published earnings rate except that the rate is determined as a percentage of the average balance during the year instead of the adjusted beginning of year balance.
- 6. Expected Core/Variable Adjustment before Adjustments**  
The relative difference in fund growth based on actual versus the 5% assumed earnings rates.
- 7. Adjustment to Relate Average Asset to Ending Liability**  
The final core/variable adjustment is calculated based on the end of year assets divided by the end of year liabilities. Since the calculations in Items 5 and 6 are based on average (approximately mid-year) balances, this adjustment is needed so that the final adjustment will be based on the end of year liabilities.
- 8. Carryover from Last Year Due to Timing of Distribution and Accounting Adjustments (and Truncation for Variable Annuity)**  
The core or variable annuity adjustments are made effective April 1 of each year. This adjustment takes into account the fact that the prior year core/variable adjustment was in effect for less than a full year as well as any accounting adjustments made to the asset value at the beginning of the year. This adjustment also carries over any truncated or rounded amounts from the prior year.

## Narrative Regarding the Development of Core and Variable Annuity Adjustments Shown on Pages 6 and 16

### 9. Experience Study Adjustment

A study is conducted for WRS every three years to analyze the assumptions that are made in the valuation versus the experience that actually occurred. If the results of the study show material changes in experience, WRS generally adopts a new set of assumptions. When assumptions are changed, this item displays the effect of the change on the core/variable adjustment. Although the mortality table now includes a projection for expected future improvements in mortality, each valuation may phase into the full table incrementally over the three year experience study cycle, depending on the size of the adjustment. By increasing reserves gradually each year, instead of all at once every three years, the effect on core and variable annuity adjustments will also be more gradual.

### 10. Experience and Other Effects

After making all other known adjustments, this is the remainder of all other experience. Changes here are primarily attributable to mortality experience and, generally to a lesser extent, on any data adjustments.

### 11. Statutory Adjustment to Round/Truncate

By statute, the core annuity adjustment is calculated to the nearest one-tenth of a percent. For the variable annuity adjustment, the adjustment is truncated to a whole percent. This is the adjustment made from the calculated core/variable annuity adjustment without rounding/truncation to the statutory rate.

### 12. Computed Average Core/Variable Annuity Adjustment

This is the end of year asset value divided by the end of year liability. It is reconciled to the published earnings rate (Item 3) by making the adjustments in Items 6 through 11.

### 13. Adjustment for Members Not Eligible for Negative Dividend

This is an adjustment that is sometimes made for Core Fund recipients to reflect that some members may not have any remaining dividends and hence are not subject to a further negative adjustment.

### 14. Final Maximum Computed Core Annuity Adjustment

When there is a negative core annuity adjustment for the Core Fund, this will affect people differently based upon year of retirement. In years when there is a negative core annuity adjustment, this will be the largest negative core annuity adjustment that will occur in the Core Fund. If greater in absolute value than 0.5% of core annuities, Item 12 plus Item 13, otherwise 0%.

## Dividend Risk Measure

In accordance with the Funding Policy, a Dividend Risk Measure (DRM) is calculated annually.

The Dividend Risk Measure is defined as the dividend liability divided by the total retiree core assets in the MRA. For 2022, dividend liability (after the dividend adjustment in April) is approximately \$14.5 billion. As of December 31, 2022, the total retiree assets are approximately \$72.1 billion, resulting in a DRM of 20.1%. This means that the retiree assets would need to decrease by 20.1% to deplete the existing dividend liability. The higher the DRM ratio, the less likely it is for the dividend liability to be depleted. Shown below is the historical DRM measure based on the Market Recognition account as well as the DRM measure on a market value basis.

