A Pension Trust Fund of the State of Minnesota

2017

Comprehensive Annual Financial Report

Teachers Retirement Association

for fiscal year ended June 30, 2017

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Teachers Retirement Association of Minnesota
A Pension Trust Fund of the State of Minnesota

Comprehensive Annual Financial Report

for the fiscal year ended June 30, 2017

Retirement Systems of Minnesota Building

60 Empire Drive
Suite 400
Saint Paul, MN 55103-4000

651.296.2409
800.657.3669

www.MinnesotaTRA.org

J. Michael Stoffel
Executive Director

Laurie Fiori Hacking
Executive Director
(outgoing January 3, 2018)

Report Prepared by the TRA accounting and executive staff

Cover: Bottle gentian, photo by Katie Steiger-Meister/USFWS, Saint Paul, MN
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Government Finance Officers Association

Certificate of Achievement for Excellence in Financial Reporting

Presented to

Minnesota Teachers Retirement Association

For its Comprehensive Annual Financial Report for the Fiscal Year Ended

June 30, 2016

Executive Director/CEO

Public Pension Coordinating Council

Recognition Award for Administration
2017

Presented to

Minnesota Teachers Retirement Association

In recognition of meeting professional standards for
plan administration as
set forth in the Public Pension Standards.

Presented by the Public Pension Coordinating Council, a confederation of

National Association of State Retirement Administrators (NASRA)
National Conference on Public Employee Retirement Systems (NCPERS)
National Council on Teacher Retirement (NCTR)

Alan H. Winkle
Program Administrator

Letter of Transmittal

J. Michael Stoffel
Executive Director

Laurie Fiori Hacking
Executive Director
(outgoing)

December 27, 2017

Members of the Board of Trustees

Teachers Retirement Association
60 Empire Drive, Suite 400
Saint Paul, MN 55103-4000

Dear Trustee:

We are pleased to present this Comprehensive Annual Financial Report (CAFR) of the Teachers Retirement Association (TRA) for the fiscal year ended June 30, 2017, our 86th year of service.

The independent Office of the Legislative Auditor has issued an unmodified (clean) opinion on TRA's financial statements for the year ended June 30, 2017. The independent auditor's report is located at the front of the Financial section of this report. Management believes that the accompanying statements, schedules, and tables are fairly presented. We are solely responsible for the content of the report, including its financial statements, which should be useful in understanding information about TRA and comparing our operating results with those of other teacher retirement systems.

TRA management has implemented a system of internal controls to monitor and safeguard assets, ensure transactions are carried out in accordance with Minnesota statutes, and promote efficient operations. Internal controls are designed to provide reasonable, but not absolute assurance regarding the safeguarding of assets against loss. The concept of reasonable assurance recognizes that a cost-benefit analysis requires estimates and judgments by management. All internal control evaluations occur within this framework.

Readers are encouraged to refer to the Management Discussion and Analysis on pages 15-19 for an overview of additions to and deductions from the TRA Fund and additional financial reporting detail for the fiscal year.

TRA Profile

As of June 30, 2017, TRA had 593 reporting units, 81,811 active members and a total of 64,774 retirees, survivors, beneficiaries, and disabilitants who were receiving monthly benefits.

Although the TRA Board of Trustees has a broad scope of authority in the operations and management of TRA, the pension fund is also governed by federal laws and state statutes. For financial reporting purposes, TRA is considered a pension trust fund of the State of Minnesota, and TRA financial results are incorporated into the Comprehensive Annual Financial Report of the State of Minnesota.

TRA follows the provisions of statements promulgated by the Governmental Accounting Standards Board (GASB). TRA's Comprehensive Annual Financial Report also complies with Minnesota Statutes, Section 356.20. Transactions are reported on the accrual basis of accounting. Contributions from employers and members are recognized as revenue when earned. Expenses are recorded when corresponding liabilities are incurred, regardless of when payment is made.

We contract for actuarial services with the firm Cavanaugh Macdonald Consulting of Bellevue, Nebraska to prepare two annual actuarial valuation reports. One report is performed in accordance with the accounting and financial reporting requirements of GASB Statement 67. The second report is performed in accordance with actuarial assumptions and methods contained in Minnesota Statutes Sec. 356.215; it also provides results that assist board members and state policymakers in funding determinations. These statutes specify key funding policy elements including amortization period, actuarial cost method, COLA valuation method, asset smoothing method and investment earnings assumption. The Minnesota Office of the Attorney General provides legal counsel to the Board of Trustees. Most financial transactions, including disbursements from the pension fund, are processed through the centralized controls of the Statewide Integrated Financial Tools (SWIFT) system, under the statutory authority of the Department of Minnesota Management and Budget and the Department of Administration.

Economic Condition

All TRA assets are invested under the authority and direction of the State Board of Investment (SBI). A listing of the pooled investments in the TRA Fund can be found on page 69. The SBI has developed strategic asset allocation and other investment policies based on the long-term investment horizon profile of our members and benefit recipients. The SBI, with advice from its Investment Advisory Council (IAC), continually reviews policies to ensure sufficient assets are available to finance benefits determined under statute. The executive directors of the three statewide retirement systems serve on the seventeen-member IAC and represent their members in advising the SBI on investment-related matters.

Economic Conditions and Outlook (from Minnesota Management and Budget)

Well into the ninth year of the current U.S. economic expansion, Minnesota's steady economic performance and tight labor market continues. The state is currently adding jobs at the same rate as the nation, and that steady job growth has kept the unemployment rate well below the U.S. rate. Statewide, there are about as many job vacancies as there are unemployed job seekers. Together, high demand for labor and low unemployment have supported growth in Minnesota wage and salary income. In October, average hourly wages by private sector employees in Minnesota were 3.9 percent higher than a year prior, ahead of the comparable rate for U.S. workers, 2.4 percent.

The state added more than 41,000 jobs in the 12 months ending in October, amounting to annual employment growth of 1.4 percent, the same as the U.S. growth rate over the same period. In this forecast, slightly higher employment growth is expected over the next few years than what was forecast in February.

Throughout 2017, Minnesota's labor force participation rate (LFPR) has trended upward. It reached 70.5 percent in October, 1.1 percentage points over a year ago and 7.8 percentage points higher than U.S. rate. The increased LFPR coincided with job growth in Minnesota that exceeded the U.S. rate during the middle months of this year. The increase is also notable, because Minnesota already had one of the highest LFPR's among U.S. states—and well above the U.S. rate—and it is occurring as baby boomers are retiring. That demographic reality, though, suggests that further large increases in Minnesota's LFPR are unlikely.

According to the Department of Employment and Economic Development's (DEED's) job vacancy report, in the second quarter of 2017, there were 0.9 unemployed persons for each vacancy compared to 1.2 a year earlier. The state's unemployed-to-job vacancy ratio has hovered between 0.9 and 1.2 since the end of 2014, indicating that the opportunities for job seekers in Minnesota have steadily improved since the recession. Geographically, about 60 percent of job vacancies were located in the Twin Cities seven-county area, and 40 percent were located in Greater Minnesota. With persistently high job vacancies, as baby boomer retirements continue, filling new positions is challenging for many of the state's employers.

Minnesota's total wage and salary income is expected to grow at moderate rates of 4.3 to 4.8 percent per year over fiscal years 2018 to 2021. This is slower growth than expected in the February forecast, primarily because actual wage income growth in 2016—the base forecast year—was lower than expected, and that lower wage growth is forecast to continue. Annual wage growth is now forecast to be 4.6 percent in fiscal year 2018 and 4.8 percent in fiscal year 2019, compared to 5.2 percent in each of those years in the prior forecast

Investment Results

The U.S. stock market, as measured by the Russell 3000 index, returned 18.5 percent for the fiscal year ended June 30, 2017. International markets returned 20.5 percent for the fiscal year as measured by the Morgan Stanley Capital International (MSCI) All Country World Index excluding the United States net taxes on dividends (ACWI ex U.S.), which represents the developed and emerging markets outside the United States. The U.S. fixed income market, as measured by the Barclays Capital Aggregate Bond Index, returned 0.3 percent for the fiscal year ended June 30, 2017.

Within this investment environment, TRA retirement assets under SBI investment management (see page 63), produced an investment return of 15.1 percent for the fiscal year ended June 30, 2017, net of fees and using the time-weighted performance method. This was well above the assumed rate of 8.0 percent for fiscal year 2017 as specified in Minnesota Statute. The 15.1 percent returned also exceeded the composite benchmark by 0.8 percent for the fiscal year. Over the latest ten-, twenty- and thirty-year periods, the funds have experienced an annualized investment return of 6.2 percent, 7.2 percent and 8.7 percent, respectively. For all three time periods, the performance of the Combined Funds exceeded the performance of the composite benchmark.

Since the benefit payments are not all immediately payable, SBI can maintain a long-term strategy. This approach, along with a well-diversified investment portfolio, helps weather periods of short-term volatility in the investment markets. The SBI also utilizes a disciplined rebalancing policy to keep asset class allocations within policy guidelines.

Legislation

The TRA Board of Trustees proposed a legislative package of reforms during the 2017 legislative session. Ultimately, the final Omnibus Retirement Bill, which passed both legislative bodies in special session, was vetoed by Governor Mark Dayton. The final bill did not contain any TRA-related benefit provisions. Governor Dayton vetoed the bill as it linked pension-related legislation to language restricting cities and other local governments from setting minimum wage rates or other worker benefits and leave terms for private employers within their jurisdictions. TRA staff continues to meet with its stakeholder groups, legislators and state budget officials, explaining the funding and contribution shortfalls that exist and the potential plan changes the board is considering as part of its 2018 legislative funding package.

Statutory Funding Status

The actuarial value of TRA assets increased as of June 30, 2017, compared to the previous year-end. For actuarial purposes, investment gains and losses are recognized over a five-year period. On June 30, 2017, the actuarial value of TRA assets was $21.1 billion, an increase from $20.2 billion on June 30, 2016. The five-year smoothing of investment gains and losses produced a deferred investment gain of $190 million as of June 30, 2017. The deferred gain will be recognized in future years.

TRA's unfunded actuarial accrued liability – the amount for which the actuarial value of assets are not available to pay benefits earned to date – decreased from $6.52 billion on June 30, 2016, to $6.36 billion on June 30, 2017. Strong investment returns in fiscal year 2017 were responsible for much of the improvement. Another key measure to assess TRA funding health is the adequacy of employee and employer contributions. As of July 1, 2017, the TRA contribution rate deficiency was 2.50 percent of active member covered payroll. Under this estimate, TRA will receive about $126 million less in contributions during fiscal year 2018 than is needed to meet the full funding target date of June 30, 2039.

In November 2017, TRA's actuarial consultant completed a limited experience study on TRA's economic assumptions. One main recommendation they provided was to lower the long-term investment earnings assumption from 8.5 percent to a flat 7.5 percent. The investment earnings assumption is set in Minnesota Statute. The TRA Board of Trustees had recommended lowering the rate as part of its 2017 legislative proposal. Ultimately, the earnings assumption was left unchanged, as the 2017 Omnibus Pension Bill was vetoed by Governor Dayton. The official actuarial results according to current statute are presented on page 81.

The TRA Board will again seek legislative approval to change the investment earnings assumption in the 2018 legislative session. Due to the likelihood that the earnings assumption will change and high stakeholder interest, we requested the TRA actuary to report the key actuarial measurements using the 7.5 percent earnings assumption. Those results are presented in the Actuarial Section of this report on page 87. Lowering the investment earnings assumption will cause policy makers to consider ways to increase contributions and/or lower plan expenses to provide for long-term funding stability of the plan.

Major Initiatives

During 2017, the most critical internal strategic initiative was the completion of the .NET project, a comprehensive assessment of current business processes and the rewriting of existing applications into a more powerful and structured computer language. Phase 1.0 of the project was implemented on July 1, 2014, with enhanced functionality for employer unit reporting. Phase 2.0 was implemented in September 2016. Key customer services in Phase 2.0 included the benefit payment process and enhanced member online account features. Phase 2.5 was completed during 2017 and consisted mainly of annual processes such as member account statements, actuarial census files, 1099-R tax reporting and revised functionalities on the member-only account portal.

The communication of the aforementioned funding shortfalls necessitates a robust presence and interaction with stakeholder groups. These groups will be engaged and consulted during the development of future legislation. Retired members are concerned about the purchasing power of their TRA pension during their retirement years. TRA must also reach and engage the youngest of our active members to help them recognize the value of TRA's defined benefit plan in their personal retirement planning.

TRA also continues the internal development of systems infrastructure to provide a wide array of member services and benefits processing. Retiring TRA members have consistently provided feedback that they highly value a private meeting with a TRA benefits counselor, away from their workplace. Although we are planning new and innovative ways to counsel members towards their retirement goals, the human interaction will continue to be the foundation of our member services.

Awards and Recognition

The Government Finance Officers Association of the United States and Canada (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to the Teachers Retirement Association for its Comprehensive Annual Financial Report for the fiscal year ended June 30, 2016. This was the nineteenth consecutive year that the Association has achieved this prestigious award. To be awarded a Certificate of Achievement, a governmental unit must publish an easily readable and efficiently organized comprehensive annual financial report. This report must satisfy both generally accepted accounting principles and applicable legal requirements. A Certificate of Achievement is valid for a period of only one year. We believe that our current comprehensive annual financial report continues to meet the Certificate of Achievement Program requirements, and we are submitting it to the GFOA to determine its eligibility for another certificate.

TRA was also awarded the Public Pension Coordinating Council's Recognition Award for Administration in 2017. This award recognizes TRA's meeting of professional standards in plan administration in categories such as benefits, actuarial valuations, financial reporting and communications to members.

The preparation of this report is possible only through the combined efforts of our employees, employer units and professional consultants. It is intended to provide a complete and reliable portrayal of the financial status of the pension fund as a basis for making management decisions and determining responsible stewardship over the assets held in trust for the members of the Association. We have notified members, employer unit officials and other interested persons about the availability of the report on the TRA website. A summary that highlights key aspects of the report will be provided to all members in the TRIB, TRA's periodic newsletter.

TRA is undergoing a leadership change. I, Jay Stoffel, was appointed TRA Executive Director on September 1, 2017. Laurie Hacking has stayed on staff since then, being of enormous help and guidance in the transition of agency head duties. Laurie will retire on January 3, 2018. TRA staff will miss her leadership, wisdom, and friendship she freely gave during her 12 years of service with the Association. Her participation on numerous committees and boards will also be greatly missed on a national level. She has mentored many in the public pension community and her influence will continue well into the future.

Lastly, our sincere appreciation is extended to all who assisted in and contributed toward the completion of this publication.

Respectfully submitted,

J. Michael Stoffel
Executive Director

Laurie Fiori Hacking
Executive Director – outgoing
(as of January 3, 2018)

John Wicklund
Chief Financial Officer

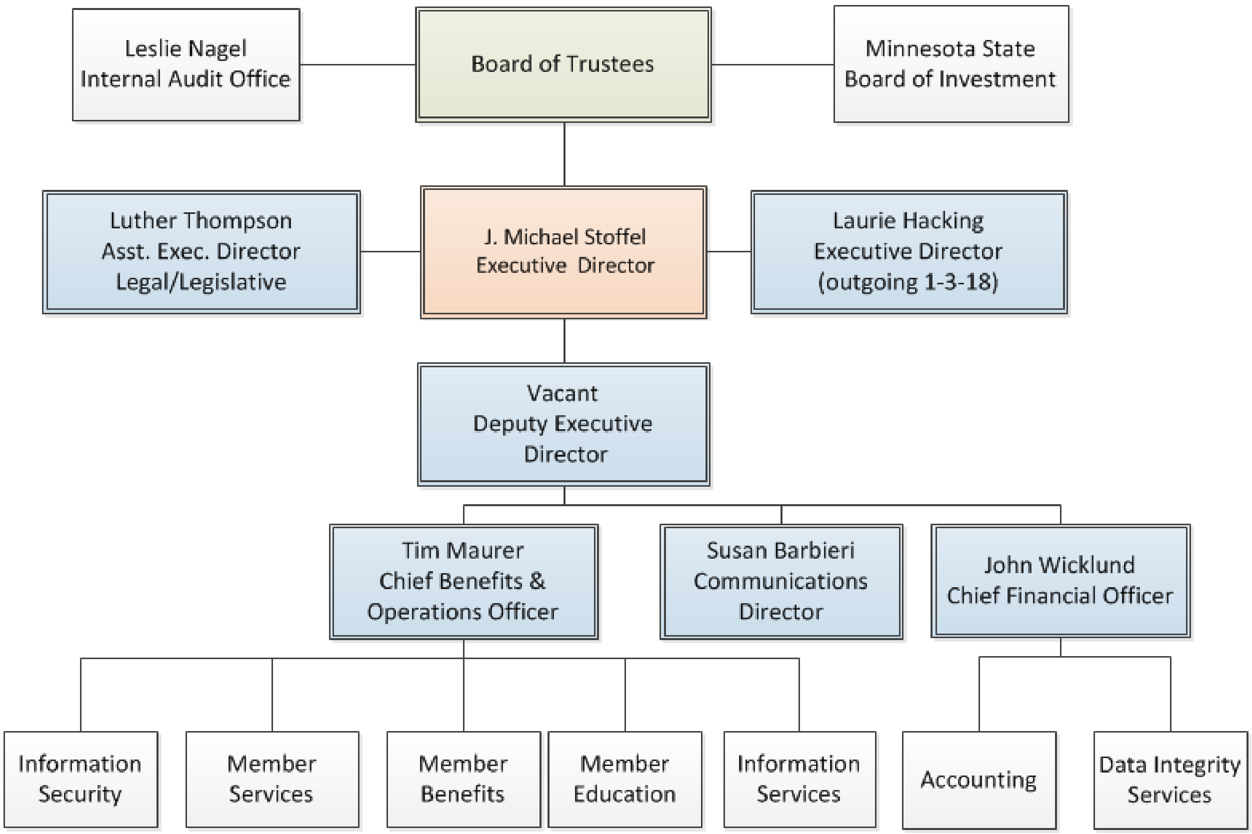
Board of Trustees

As of December 11, 2017

Administrative Staff

Administrative Organization

As of December 2017



Consulting Services

Actuary

Cavanaugh Macdonald Consulting, LLC

Bellevue, Nebraska

Auditor

Office of the Legislative Auditor

Saint Paul, Minnesota

Investment

Minnesota State Board of Investment

Saint Paul, Minnesota

(Schedule of Investment Management Fees is found on pages 67-68)

Legal Counsel

Office of the Attorney General

Saint Paul, Minnesota

Medical Advisor

ExamWorks

Minneapolis, Minnesota

Our Mission Statement

TRA provides retirement, disability and survivor benefits to Minnesota's public educators assisting them in achieving future income security.

TRA strives to provide benefits that attract and retain competent teachers who serve communities throughout the state, building a stronger education system.

TRA is committed to safeguarding the financial integrity of the fund and takes pride in providing exceptional, innovative services.

Our Vision

To be an outstanding retirement system pursuing benefits and services that **exceeds members' expectations**.

Goals

Members and Stakeholders – Be responsive to the needs of TRA members and stakeholders by providing them with innovative, timely and relevant services and education, and adequate benefits that are properly funded.

Organizational Effectiveness – Be a proactive, flexible efficient organization by measuring performance and continuously improving work processes.

Staff Development – Make TRA an "employer of choice" for both existing and potential staff by providing a supportive and challenging environment that encourages teamwork and creativity, fosters professional growth and development, and values employee input.

Finance and Resources – Safeguard the financial integrity of the fund by ensuring adequate funding, legal compliance and responsibly managing fiscal resources.

Technology – Maintain the internal capacity to utilize cutting-edge technologies that continuously improve work processes and enhance service delivery and communication with our members and stakeholders.

Teachers Retirement Association of Minnesota
A Pension Trust Fund of the State of Minnesota

Financial

OFFICE OF THE LEGISLATIVE AUDITOR
STATE OF MINNESOTA • James Nobles, Legislative Auditor

Independent Auditor's Report

Members of the Board of Trustees
Teachers Retirement Association

Mr. J. Michael Stoffel and Ms. Laurie Fiori Hacking, Executive Directors
Teachers Retirement Association

Report on the Financial Statements

We have audited the accompanying financial statements of the Teachers Retirement Association (TRA), which included the statement of fiduciary net position as of June 30, 2017, the related statement of changes in fiduciary net position, and notes to the financial statements, as listed in the Table of Contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal controls relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal controls relevant to TRA's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of TRA's internal controls. Accordingly, we express no such opinion.

An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Room 140 Centennial Building, 658 Cedar Street, St. Paul, Minnesota 55155-1603 • Phone: 651-296-4708 • Fax: 651-296-4712
E-mail: legislative.auditor@state.mn.us • Website: www.auditor.leg.state.mn.us • Minnesota Relay: 1-800-627-3529 or 7-1-1

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the Teachers Retirement Association as of June 30, 2017, and the changes in financial position for the period then ended in conformity with accounting principles generally accepted in the United States of America.

Emphasis of Matter – GASB and Statutory Financial Reporting Requirements

Minnesota Statutes 2017, 356.20, require TRA to include in its financial report information using funding-focused statutory assumptions and methodologies. For its fiscal year 2017 financial report, the funding-focused information differs from the GASB-based information primarily for the following reasons:

(1) The discount rate required by statute for funding purposes was higher than the discount rate used for financial reporting purposes. The discount rate is the rate used to bring the projected benefit payments to the present value of those benefits (the pension liability). A higher discount rate results in a smaller pension liability.

(2) For funding purposes, statutes require investment gains and losses be recognized over a five-year period to "smooth" the volatility that can occur from year to year. For GASB financial reporting purposes, assets are valued at fair (market) value as of the end of the fiscal year.

Including funding-focused information was necessary for TRA to comply with state law and had no effect on our audit opinion.

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that Management's Discussion and Analysis and the other required supplementary information, as listed in the Table of Contents, be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements.

We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Other Information Included with the Financial Statements

Our audit was conducted for the purpose of forming an opinion on the financial statements that collectively comprise TRA's basic financial statements. The supporting schedules in the Financial Section and the Introductory, Investment, Actuarial, and Statistical Sections, as listed in the Table of Contents, are presented for purposes of additional analysis and are not a required part of the basic financial statements.

The supporting schedules, as listed in the Financial Section of the Table of Contents, are the responsibility of management and were derived from and relate directly to the underlying accounting and other records used to prepare the basic financial statements. The supporting schedules have been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the supporting schedules are fairly stated, in all material respects, in relation to the basic financial statements as a whole.

The Introductory, Investment, Actuarial, and Statistical Sections have not been subjected to the auditing procedures applied in the audit of the basic financial statements and, accordingly, we do not express an opinion or provide any assurance on them.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we will also issue a report on our consideration of TRA's internal controls over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, grant agreements, and other matters. The purpose of that report is to describe the scope of our testing of internal controls over financial reporting and compliance and the results of that testing and not to provide an opinion on the internal controls over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* and should be considered in assessing the results of our audit.

James R. Nobles
Legislative Auditor

Tracy Gebhard, CPA
Audit Director

December 22, 2017
Saint Paul, Minnesota

Management Discussion and Analysis

June 30, 2017

This discussion and analysis of the Teachers Retirement Association (TRA) of Minnesota provides an overview of TRA financial activities for the fiscal year ended June 30, 2017. We encourage you to consider the information presented here in conjunction with the transmittal letter beginning on page 3 and the additional information presented in the financial statements and required supplementary information.

Financial Highlights

Financial highlights of fiscal year 2017 include:

- The Net Position Restricted for Pension Benefits increased in value by $1.8 billion during fiscal year 2017 for a total of $21.3 billion. Plan contributions and investment income totaled $3.6 billion during the fiscal year. Plan benefits and other expenses totaled $1.8 billion during the fiscal year.
- Investment returns for the 2017 fiscal year were 15.1 percent using the time-weighted value method, resulting in net investment gain of $2.9 billion.
- Contributions paid by employees, employers, and non-employers during fiscal year 2017 totaled $764.5 million, an increase of $26.7 million from the fiscal year 2016 total of $737.8 million.
- Pension benefits paid to retirees and beneficiaries during fiscal year 2017 was $1.77 billion. The fiscal year 2016 total was $1.72 billion, an increase of $48.9 million during the year.
- Refunds of member contributions plus interest during fiscal year 2017 were $11.24 million. The fiscal year 2016 total was $11.29 million.
- Administrative expenses of the fund during fiscal year 2017 were $11.70 million. The fiscal year 2016 total was $11.34 million, representing an increase of $364 thousand for the fiscal year.

Actuarial Highlights

The Association's funding objective is to meet long-term benefit obligations through the accumulation of contributions and investment income. This funding is structured so that the burden of paying retirement costs is shared equitably by present and future generations of members and taxpayers.

By state law, TRA and its actuarial consultant are required to prepare an actuarial funding valuation to assist decision-makers in assessing the funding strength and position of the TRA fund. The results of this actuarial valuation report will be used to describe key funding measures such as the funding ratio, the unfunded actuarial accrued liability and the contribution rate deficiency.

As of June 30, 2017, the accrued liability funding ratio for TRA was 76.8 percent, an increase from the comparable funding ratio of 75.6 percent as of June 30, 2016. TRA's unfunded actuarial accrued liability on June 30, 2016, was $6.52 billion. The June 30, 2017, unfunded actuarial liability was $6.36 billion, a decrease of $157 million from the previous year. The net gain was based on a favorable experience with investments of $303 million and an assumption change involving the Combined Service Annuity (CSA) benefit provision of $104 million. Those gains were partly offset by a $69 million actuarial experience loss for the year. TRA's unfunded liability, by state law, must be fully paid by June 30, 2039. Key actuarial funding ratios are presented on page 81.

TRA's actuary has also prepared a separate actuarial valuation report under the requirements of GASB Statement 67 for presentations and disclosures within the Financial section of this report. The GASB 67 valuation report is the foundation of a report TRA will issue in the first half of 2018 to assist employer units in their GASB 68 financial reporting presentations and disclosures later in 2018.

Overview of the Financial Statements

This discussion and analysis is intended to serve as an introduction to the financial report of TRA. The financial report consists of:

- the basic financial statements, comprised of the Statement of Fiduciary Net Position and the Statement of Changes in Fiduciary Net Position;

- the notes to the basic financial statements;
- required supplementary information; and
- other supplementary information.

The Statement of Fiduciary Net Position (page 20) presents information on the assets and liabilities of TRA, with the difference between the two reported as net position. The net position of the Association reflects the resources available to pay benefits to members when due. Over time, increases and decreases in net position measure whether the Association's financial position is improving or deteriorating. It can be thought of as a snapshot of the financial position of TRA at that specific point in time.

The Statement of Changes in Fiduciary Net Position (page 21) presents information detailing the changes in net position that occurred during the current fiscal year. All changes in net position are reported on an accrual basis. This means that the revenue or expense is recognized as soon as the underlying event giving rise to the change occurs, regardless of when the actual cash is received or paid. Thus, revenues and expenses are reported in this statement for some items that will not result in cash flows until future fiscal periods.

The notes to the financial statements (pages 22-45) provide additional information that is essential to a full understanding of the data provided in the financial statements.

The report also contains required supplementary information in addition to the basic financial statements. The required supplementary information (pages 46-51) will be built prospectively and in time, will form a ten-year historical trend. The Schedule of Changes in the Employers' Net Pension Liability includes a reconciliation of the fiscal year 2017 net pension liability for GASB 67 reporting purposes.

The Schedule of Employer and Non-Employer Contributions presents information about the annual required contributions and resulting contributions in relation to this requirement, covered employee payroll, and contributions as a percentage of covered payroll.

The Schedule of Investment Returns using the money-weighted method is presented. It will be developed prospectively over the next 10 years.

Two other supporting schedules are also presented. The Schedule of TRA Administrative Expenses (page 54) presents the overall cost of administering the Association. The Schedule of Professional Consultant Expenses (page 55) further details this category of administrative expense.

Financial Analysis of the TRA Fund

Plan Assets

Total plan assets of the TRA fund as of June 30, 2017, were $23.5 billion and were mostly comprised of cash, investments and contributions due from employers. Total plan assets increased $1.3 billion from the June 30, 2016 total of $22.2 billion. The primary reason was the increase in the fair value of TRA assets due to strong investment performance.

Plan Liabilities

Total liabilities as of June 30, 2017, were $2.2 billion, a decrease of 20.5 percent from the June 30, 2016 liability amount of $2.8 billion. The primary reason was the decrease in value of liabilities in the securities lending program. In both years, the liability amounts were mostly comprised of obligations under security lending arrangements, accounts payable and long-term bonds payable for the building co-owned by the Association.

Net Position

Association assets exceeded liabilities on June 30, 2017, by $21.2 billion. The amount has increased from the June 30, 2016, amount of $19.4 billion by $1.8 billion. TRA relies heavily on investment earnings to help pay benefits and expenses over the long term, since annual employee and employer contributions are less than one-third of the amount needed to fund cash outflows. As a result, the fair value of assets of the TRA fund will generally decline during periods of weak investment performance, but rise during strong performance.

Revenues — Additions to Fiduciary Net Position

Total additions to the TRA Fund during fiscal year 2017 were $3.62 billion, an increase of $2.9 billion from $720 million in fiscal year 2016. The increase is due to significantly stronger investment earnings in fiscal year 2017 than in the prior fiscal year.

Total employee and employer contributions for fiscal year 2017 increased $26.7 million from the previous fiscal year for a combined fiscal year total of about $764.5 million. The increase is attributable to higher covered salaries earned by active members for fiscal year 2017. Contributions during fiscal year 2017 were prescribed in statute at 7.5 percent employee and 7.5 percent employer for Coordinated Plan members of TRA.

A net investment gain of $2.86 billion was recorded for fiscal year 2017. This amount increased by $2.88 billion from the fiscal year 2016 loss amount of $0.02 billion.

Fiduciary Net Position

Dollar Amounts in Thousands

	2017	2016	Change
Cash and Investments	$ 23,410,585	$ 22,145,519	$ 1,265,066
Receivables	21,280	21,765	(485)
Other	23,220	21,595	1,625
Total Assets	23,455,085	22,188,879	1,266,206
Total Liabilities	2,196,995	2,764,448	(567,453)
Fiduciary Net Position	$ 21,258,090	$ 19,424,431	$ 1,833,659

Changes in Fiduciary Net Position

Dollar Amounts in Thousands

Additions	2017	2016	Change
Employee Contributions	$ 361,175	$ 347,256	$ 13,919
Employer Contributions	403,379	390,549	12,830
Net Investment Income/(Loss)	2,855,217	(23,672)	2,878,889
Other	4,398	5,529	(1,131)
Total Additions	$ 3,624,169	$ 719,662	$ 2,904,507

Deductions	2017	2016	Change
Monthly Benefits	$ 1,767,568	$ 1,718,694	$ 48,874
Refunds of Contributions	11,240	11,290	(50)
Administrative Expenses	11,702	11,338	364
Total Deductions	1,790,510	1,741,322	49,188
Change in Fiduciary Net Position	$ 1,833,659	$ (1,021,660)	$ 2,855,319

Expenses — Deductions from Fiduciary Net Position

The primary expenses of TRA include the payment of pension benefits to members and beneficiaries, refunds of contributions to former members, and the cost of administering the Fund. Retirement benefit expenses increased by $48.9 million due to an increase in the number of recipients and a 2.0 percent benefit increase paid to eligible recipients on January 1, 2017.

Member refunds of $11.24 million decreased by $50 thousand during fiscal year 2017 from the fiscal year 2016 total of $11.29 million.

Administrative expenses increased by 3.2 percent during the fiscal year – from $11.34 million in fiscal year 2016 to $11.70 million in fiscal year 2017. Overall, fund deductions increased $49.2 million during fiscal year 2017.

Actuarial Funding Valuations Highlights

The financial health of a public pension plan is not exclusively assessed by analyzing the basic financial statements. To assist funding analysis, TRA's actuary prepared an actuarial valuation in accordance with Minnesota Statute 356.215. These financial statements should also be reviewed in conjunction with the Actuarial section of this CAFR.

Mostly due to a strong investment gain earned in fiscal year 2017, the actuarial value of assets increased from $20.19 billion on June 30, 2016 to $21.06 billion as of June 30, 2017. The actuarial value of assets smooths investment gains and losses over a five-year period to minimize the volatility associated with any one year. On fair value basis, TRA assets were $21.25 billion on June 30, 2017. The difference between the actuarial value and the fair value of assets is $190 million and represents deferred gains that will be recognized in future years or will be used to absorb investment losses should the markets decline.

TRA's actuarial accrued liability on June 30, 2017, increased to $27.4 billion from the June 30, 2016, amount of $26.7 billion, an increase of 2.7 percent. Accrued liabilities increased, in part, due to additional service earned by active members during fiscal year 2017 and interest charged to the fund on the existing unfunded liability.

TRA's unfunded actuarial liability on June 30, 2016, was $6.52 billion. The June 30, 2017, unfunded actuarial liability decreased to $6.36 billion, representing a decrease of $160 million. By statute, the unfunded liability must be recovered in full by June 30, 2039.

TRA's funding objective is to meet long-term benefit obligations through the accumulation of contributions and investment income. As of June 30, 2017, the actuarial accrued liability funding ratio for TRA was 76.8 percent, an increase from the comparable funding ratio of 75.6 percent as of June 30, 2016. The funding increase was driven primarily by strong investment performance during fiscal year 2017.

TRA's statutory contribution rate of 15.93 percent of member covered payroll is currently trailing the required contribution rate calculated by TRA's actuarial consultant. The required contribution rate to fund normal pension costs, amortizing the unfunded actuarial liability, plus TRA administrative costs was calculated as 18.43 percent. The resulting contribution deficiency is 2.50 percent of employee covered payroll, or about $126.3 million projected in fiscal year 2018.

Employee and employer contribution rates are reviewed and set into law by the Minnesota legislature. The actuarial results presented are reflective of most, but not all of the economic and demographic assumptions recommended in TRA's experience study report of June 2015. In November 2017, TRA's actuary conducted a follow-up partial experience study of economic assumptions and has recommended modifying all the economic assumptions again including lowering the investment earnings and liability discount assumption to 7.5 percent for all years. If the earnings and liability assumption is modified during the 2018 legislative session as TRA management expects, the impact upon the actuarial results presented in the Actuarial section of this report would produce a weaker funded ratio and higher contribution deficiency.

GASB 67-68 actuarial valuation results

The TRA Board of Trustees authorized a separate actuarial valuation report designed to comply with the provisions of GASB Statement 67. The Required Supplementary Information, beginning on page 46, details the results of this valuation report. The focus of this valuation is primarily for financial statement presentations rather than funding analysis. Under the set of assumptions used in this valuation, TRA had a net pension liability of $19.96 billion on June 30, 2017 and a contribution deficiency of $113.2 million for fiscal year 2017. The GASB 67 investment return for fiscal year 2017, using the money-weighted method, was 15.182 percent.

The Net Pension Liability of $19.96 billion on June 30, 2017, is a decrease of 16.3 percent from the $23.85 billion calculated at June 30, 2016. The decrease (improvement) is attributable to the strong investment return and an increase in fund net position that occurred by the end of fiscal year 2017. Under GASB 67 parameters, the actuary must calculate the date on which June 30, 2017 assets would be depleted, absent future cash flows and asset accumulations that would occur related to future members of the Association.

The actuarial consultant has determined that using the GASB 67 methodology, TRA assets would be depleted on June 30, 2053. For benefit payments TRA will make after 2053, a lower discount rate of 3.56 percent must be used. The discount rate for payments from the current time through June 30, 2053, was set by TRA management to be 7.5 percent annually. Under GASB 67, a single equivalent rate is determined based on the weighting of these two discount rates. The single equivalent interest rate (SEIR) was calculated at 5.12 percent annually, an increase from the 4.66 percent annually used for all benefit payments in the fiscal year 2016 actuarial valuation. The impact of using a higher SEIR on the fund's liabilities is partially responsible for the decline in the net pension liability discussed earlier.

TRA will allocate the results of the GASB 67 accounting valuation to each employer unit. We plan to provide employer units with this information in the second quarter of calendar year 2018 to facilitate their compliance with the financial reporting requirements of GASB Statement 68 for their fiscal year 2018 financial reporting cycle.

The complete GASB 67 accounting valuation report is available at: www.MinnesotaTRA.org/FORMSPUB/eepubs.html

Summary

Due to the long-term nature of defined benefit plans, one must review the financial performance of TRA over a period of years and not at any one point in time. The funding ratio of the TRA fund increased from 75.6 percent to 76.8 percent for fiscal year 2017. However, pending actuarial recommendations on assumption changes are likely to be considered by the 2018 legislature. Adoption of the recommended assumptions would lower the funded ratio and increase TRA's contribution deficiency presented in this report.

The long-term financial health of TRA, like all retirement funds, is heavily dependent on two key items: (1) future investment returns and (2) contributions. A contribution deficiency of 2.50 percent of member payroll exists based on the assumptions used for the 2017 valuation. If the investment earnings assumption for the funding valuation report is changed to 7.50 percent for all years, the contribution deficiency would worsen to 7.40 percent of member payroll. Acknowledging the magnitude of the contribution deficiency, the TRA Board of Trustees is developing a 2018 legislative package of benefit provision cuts and increased contribution rates to narrow that deficiency and improve the funded ratio. Ultimately, the actual investment market returns over the coming years will be the most significant factor in whether or not TRA's goal of amortizing the unfunded actuarial accrued liability by June 30, 2039, will be reached.

Teachers Retirement Fund
Statement of Fiduciary Net Position

June 30, 2017

Assets		
Cash and Short-term Investments		
Cash	$	6,751,324
Building Account Cash		41,038
Short-term Investments		622,772,682
Total Cash and short-term investments		629,565,044
Accounts Receivable		21,280,972
Investments (at fair value)		
Bond Pool		4,098,976,802
Alternative Investments Pool		2,773,952,135
U.S. Stock Index Pool		3,502,669,722
U. S. Stock Actively Managed Pool		5,639,645,061
Broad International Stock Fund		4,583,376,907
Total Investments		20,598,620,627
Securities Lending Collateral		2,182,398,978
Building		
Land		171,166
Building & Equipment Net of Depreciation		6,251,130
Total Building		6,422,296
Capital Assets Net of Depreciation and Amortization		16,797,722
Total Assets	$	23,455,085,639
Liabilities		
Current		
Accounts Payable	$	8,367,519
Accrued Compensated Absences		98,794
Accrued Expenses - Building		41,053
Bonds Payable		615,600
Bond Interest Payable		11,091
Securities Lending Collateral		2,182,398,978
Total Current Liabilities		2,191,533,035
Long Term		
Accrued Compensated Absences		834,224
Bonds Payable		4,627,952
Total Long Term Liabilities		5,462,176
Total Liabilities		2,196,995,211
Net Position Restricted For Pensions	$	21,258,090,428

The accompanying notes are an integral part of this statement.

Teachers Retirement Fund
Statement of Changes in Fiduciary Net Position

For the Fiscal Year Ended June 30, 2017

Additions		
Contributions		
Employee	$	361,175,007
Employer		367,791,438
Direct Aid (State/City/District)		35,587,410
Earnings Limitation Savings Account (ELSA)		1,994,842
Total Contributions	$	766,548,697
Investment Income		
Net Appreciation in Fair Value of Investments	$	2,863,553,994
Investment Expense		(22,060,034)
Net Investment Increase	$	2,841,493,960
Securities Lending Activities		
Securities Lending Income	$	31,121,762
Securities Lending Expenses:		
Borrower Rebates		(12,814,423)
Management Fees		(4,584,053)
Total Securities Lending Expenses	$	(17,398,476)
Net Income from Securities Lending	$	13,723,286
Total Net Investment Income	$	2,855,217,246
Other Income	$	2,403,728
Total Additions	$	3,624,169,671
Deductions		
Retirement Benefits Paid	$	1,765,573,016
Earnings Limitation Savings Account		1,994,842
Refunds of Contributions to Members		11,240,388
Administrative Expenses		11,702,196
Total Deductions	$	1,790,510,442
Net Increase	$	1,833,659,229
Net Position Restricted for Pensions		
Beginning of Year	$	19,424,431,199
End of Year	$	21,258,090,428

The accompanying notes are an integral part of this statement.

Notes to the Financial Statements

For the Fiscal Year Ended June 30, 2017

1. Description of TRA

A. Organization

The Teachers Retirement Association (TRA) is an administrator of a multiple employer, cost-sharing retirement fund. TRA administers a Basic Plan (without Social Security coverage) and a Coordinated Plan (coordinated with Social Security coverage) in accordance with Minnesota Statutes, Chapters 354 and 356. Assets of the fund may be used to pay benefits to both Basic and Coordinated members without legal restriction.

B. Participating Members and Employers

Teachers employed in Minnesota's public elementary and secondary schools, charter schools, and certain educational institutions maintained by the state (except those teachers employed by the city of St. Paul and by the University of Minnesota system) are required to be TRA members.

State university, community college, and technical college teachers first employed by the Minnesota State College and Universities (MnSCU) may elect TRA coverage within one year of eligible employment. Alternatively, these teachers may elect coverage through the Defined Contribution Retirement Plan (DCR) administered by MnSCU. A teacher employed by MnSCU and electing coverage by DCR is not a member of TRA except for purposes of Social Security coverage.

A schedule of employer units and membership is presented in *Figure 1, Employer Units and Membership*.

Figure 1. Employer Units and Membership

Employer Units	
Independent school districts	373
Colleges and universities	39
State agencies	4
Charter schools	173
Professional organizations	4
Total Employer Units	593
Membership	
Retirees, disabilitants and beneficiaries receiving benefits	64,774
Terminated employees with deferred vested benefits	14,030
Total	78,804
Current employees	
Vested	64,890
Non-vested	16,921
Total	81,811

C. Benefit Provisions

TRA provides retirement benefits, as well as disability benefits to members and benefits to survivors upon the death of eligible members. All benefits vest after three years of eligible service credit. The defined retirement benefits are based on a member's highest average salary for any consecutive 60 months of formula service, age and years of formula service credit at termination of service. TRA members belong to either the Basic or Coordinated Plan.

Two methods are used to compute benefits for TRA's Coordinated and Basic Plan members. Members first employed **before July 1, 1989**, receive the greater of the Tier I or Tier II benefits as described:

Tier I	Step Rate Formula	Percentage
Basic	1st ten years of service	2.2 percent per year
	All years after	2.7 percent per year
Coordinated	1st ten years if service years are prior to July 1, 2006	1.2 percent per year
	1st ten years if service years are July 1, 2006 or after	1.4 percent per year
	All other years of service if service years are prior to July 1, 2006	1.7 percent per year
	All other years of service if service years are July 1, 2006 or after	1.9 percent per year

With these provisions:

(a) Normal retirement age is 65 with less than 30 years of allowable service and age 62 with 30 or more years of allowable service.

(b) 3 percent per year early retirement reduction for all years under normal retirement age.

(c) Unreduced benefits for early retirement under a Rule-of-90 (age plus allowable service equals 90 or more).

Or

Tier II Benefits

For years of service prior to July 1, 2006, a level formula of 1.7 percent per year for Coordinated plan members and 2.7 percent per year for Basic Plan members. For years of service July 1, 2006 and after, a level formula of 1.9 percent per year for Coordinated members and 2.7 for Basic members applies. An actuarial reduction is applied to members retiring prior to age 65. Members who reach age 62 with 30 years of service have a lower (more favorable to the member) reduction rate applied.

Members first employed **after June 30, 1989**, receive only the Tier II benefit calculation with a normal retirement age that is their retirement age for full Social Security retirement benefits, but not to exceed age 66.

Other

Former Minneapolis Teachers Retirement Fund Association (MTRFA) members with Basic Program eligibility retain the plan provisions of the Basic Program as defined in the MTRFA Articles of Incorporation and Bylaws as they existed at merger on June 30, 2006. Sixteen former MTRFA active and inactive members retain Basic Program coverage.

Former members of the Duluth Teachers Retirement Fund Association (DTRFA) retain the plan provisions as defined in the DTRFA Articles of Incorporation and Bylaws as they existed at merger on June 30, 2015.

The benefit provisions stated in the preceding paragraphs of this section are current provisions and apply to active plan participants. Vested, terminated members who are entitled to benefits, but are not yet receiving them, are bound by the provisions in effect at the time they last terminated their public service. Pension benefits are funded from member and employer contributions and income from investment of fund assets.

D. Reporting Entity

TRA functions as a statutory entity created by the Minnesota Laws of 1931, Chapter 406. The Association maintains rights to sue or be sued in its own name and to hold property in its own name. For financial reporting purposes, TRA is considered a pension trust fund of the State of Minnesota and is included in the State's Comprehensive Annual Financial Report with its fiduciary funds.

The State of Minnesota acts as a fiduciary and trustee of TRA's funds. The eight member Board of Trustees is defined by Minnesota Statute, section 354.06, and consists of four active member representatives, one retired member representative, and three statutory officials. The Board has significant independence in the operations and management of the Association, though the State Legislature actually determines the contribution rates for members and employers and sets benefits levels. The Board of Trustees is responsible for TRA's administration, but the State Board of Investment (SBI) is responsible for investing plan assets.

2. Summary of Significant Accounting Policies

A. Basis of Accounting

TRA financial statements for its defined benefit fund are prepared using the accrual basis of accounting. Employee and employer contributions are recognized as revenue in the year in which they are due pursuant to Minnesota Statute. Expenses including benefit payments and refunds are recorded when the liability is due and payable according to Minnesota Statute.

The Governmental Accounting Standards Board (GASB) is the independent organization that establishes accounting and financial reporting standards for governmental entities. TRA's financial reporting follows the requirements of GASB through Statement No. 82.

B. Accounts Receivable

Amounts classified as accounts receivable consist primarily of employee contributions, employer contributions, and direct statutory payments from employers received after the fiscal year end on salaries earned prior to June 30, 2017. Under Minnesota Statutes, section 354.52, subdivision 4, TRA employers must remit contributions within 14 days after the member is paid.

A Schedule of Accounts Receivable as of June 30, 2017, is presented in *Figure 2, Schedule of Accounts Receivable*.

Figure 2. Schedule of Accounts Receivable

Description	Amount
Member Contributions	$ 9,607,187
Employer Contributions	9,661,697
Direct Aid (State/City/School)	1,125,000
SBI	390,473
Interest on Investments	493,663
Health/Wellness Reimbursement	588
St. Cloud Office Reimbursement	2,328
Bond Interest	36
Total Receivables	$ 21,280,972

C. Investment Policies

Pursuant to Minnesota Statutes, Chapter 11A, the state's retirement fund assets are commingled in various pooled investment accounts, administered by the Minnesota State Board of Investment (SBI). As of June 30, 2017, the TRA Fund's share of the Combined Funds administered by SBI at fair value was approximately 33.1 percent ($21.2 billion – TRA and $64.1 billion– total).

The SBI is established by Article XI of the Minnesota Constitution to invest all state funds. Its membership as specified in the Constitution is composed of the Governor (who is designated as chair of the Board), State Auditor, Secretary of State, and the State Attorney General.

All investments undertaken by the SBI are governed by the prudent person rule and other standards codified in Minnesota Statutes, Chapter 11A and Chapter 356A.

Within the requirements defined by state law, the SBI, with the assistance of SBI staff and the Investment Advisory Council, establishes investment policy for all funds under its control. These investment policies are tailored to the particular needs of each fund and specify investment objectives, risk tolerance, asset allocation, investment management structure, and specific performance standards. Studies guide the ongoing management of the fund and are updated periodically.

Asset Allocation

To match the long term nature of the pension obligations, the SBI maintains a strategic asset allocation for the Combined Funds that includes allocation to public equity, domestic bonds, private markets and cash equivalents.

Description of significant investment policy changes during the year

At the June 2, 2016, board meeting, the board passed a motion to authorize a number of changes related to the strategic assets allocation for fiscal year 2017. The changes listed in *Figure 3, Strategic Asset Allocation*, were the result of the 2016 Combined Funds Asset Liability Study conducted by the SBI investment consultant.

Figure 3. Strategic Asset Allocation

	Allocation through Fiscal Year 2016	Allocation for Fiscal Year 2017
Public equity	60%	58%
Domestic equity	*45%*	*39%*
International equity	*15%*	*19%*
Domestic bonds	18%	20%
Private markets	20%	20%
Cash	2%	2%
Total	**100%**	**100%**

When the actual asset allocation deviates beyond specified ranges, assets are rebalanced to achieve the long-term allocation targets.

If a 20 percent allocation to Private Markets cannot be achieved, the uncommitted allocation will be invested in public equities.

Benchmarks

New benchmarks were approved for public equities. The Asset Class Target for Public Equities will be a composite index of the domestic equity asset class target (the Russell 3000 Index) and the international equity asset class target, (the MSCI ACWI ex USA Index). The weighting of these two indices is 75 percent U.S. and 25 percent Non-U.S. until the completion of the transition to the Fiscal Year 2017 allocation. The weightings transition was completed to a blend of 67 percent U.S. and 33 percent Non-U.S. by June 30, 2017.

The U.S. equity portion of Public Equities will continue to be benchmarked against the Russell 3000 Index. This includes any of the Russell 3000 sub-indices that are segmented by market cap and by style such that the aggregation of the U.S. equity manager benchmarks are reflective of the Russell 3000 index.

The Non-U.S. equity portion of Public Equities will continue to be benchmarked against the MSCI ACWI ex-USA Index. The SBI will be authorized to invest in and benchmark Non-U.S. equity managers to the MSCI ACWI ex USA (standard) Index. This includes any of the MSCI ACWI ex USA sub-indices that are segmented by market cap, style or geography such that the aggregation of the Non-U.S. equity manager benchmarks are reflective of the MSCI ACWI ex USA Index. Additionally, the SBI will be authorized to opportunistically invest in non-U.S. equity managers that are benchmarked to the small cap segments of the MSCI ACWI.

The Investment Advisory Council Board also authorized the SBI to invest with Global Managers who invest in and are benchmarked to the MSCI ACWI or the MSCI World indices.

The long term expected rate of return on pension plan investments was determined using a building-block method. Best estimates for expected future real rates of return (expected returns, net of inflation) were developed for each asset class using both long-term historical returns and long-term capital market expectations from a number of investment management and consulting organizations. The asset class estimates and the target allocations were then combined to produce a geometric, long-term expected real rate of return for the portfolio. Inflation expectations were applied to derive the nominal rate of return for the portfolio.

Information on investment activity, investment management fees and a listing of specific investments owned by the pooled asset accounts can be obtained by contacting:

Minnesota State Board of Investment
60 Empire Drive, Suite 355
St. Paul, MN 55103-3555

SBI's target allocation policy is shown in *Figure 4*.

Figure 4. Long-Term Expected Rate of Return

	Target Allocation	Long-Term Expected Real Rate of Return (geometric)
Domestic Stocks	39%	5.10%
International Stocks	19%	5.20
Bonds	20%	0.75
Alternative Assets	20%	5.90
Cash	2%	0.00
Total	**100%**	

Portfolio Rate of Return	5.05%
Inflation	2.25%
Nominal Rate of Return	7.30%

Minnesota Statutes, section 11A.24, broadly restricts retirement fund investments to obligations and stocks of the United States and Canadian governments, their agencies and their registered corporations; short-term obligations of specified high quality; restricted participation as a limited partner in venture capital, real estate or resource equity investments; restricted participation in registered mutual funds; and some qualified foreign instruments.

Investments in the pooled accounts are reported at fair value. The pooled accounts have not been rated for credit quality. *Figure 5, TRA Investment Portfolio*, provides a summary of the cost and fair values of the investments as of June 30, 2017, as reported on the Statement of Fiduciary Net Position. Securities traded on a national or international exchange are valued using the last reported trade price. The fair value of real estate investments is based on independent yearly appraisals. Investments that do not have an established market are reported at estimated fair value.

Figure 5. TRA Investment Portfolio

TRA Investment Portfolio: June 30, 2017		
TRA Fund	**Cost**	**Fair Value**
Pooled Accounts		
Bond Pool	$ 3,939,884,291	$ 4,098,976,802
US Stock Index Pool	2,430,795,672	3,502,669,722
Broad International Stock Fund	3,889,634,876	4,583,376,907
Alternative Pool	2,740,046,415	2,773,952,135
Small Cap Active	652,144,653	754,672,007
Large Cap Active	1,169,877,043	1,340,952,918
Large Passive	3,237,606,429	3,544,020,136
Total	$ 18,059,989,379	$ 20,598,620,627
Short-Term Cash Equivalents		
DB Money Market	$ 523,576,234	$ 523,947,472
CD Repo Pool	98,702,783	98,825,210
Total	$ 622,279,017	$ 622,772,682
Total Invested	$ 18,682,268,396	$ 21,221,393,309

Included in the short-term investment category is a program managed by the SBI in which it purchases certificates of deposits (CD) in Minnesota financial institutions. The SBI receives a market rate of return on these investments. The CD investments are insured by the Federal Deposit Insurance Corporation.

Investment income is recognized as earned. Accrued investment income of the pooled investment accounts is included in participation in the accounts. Gains or losses on sales or exchanges are recognized on the transaction date.

Net investment income is summarized on the Statement of Changes in Fiduciary Net Position. The summarized amounts show net investment income of $2.855 billion for fiscal year 2017.

The cost of security transactions is included in the transaction price. Administrative expenses of SBI and investment management fees of the external money managers and the state's master custodian for pension fund assets are allocated to the funds participating in the pooled investment accounts (page 62). TRA's share of these expenses totaled $22.1 million (page 55).

A detailed schedule of fees and commissions by brokerage firm, along with the number of shares traded, total commissions, and commissions per share may be obtained by writing:

Minnesota State Board of Investment
60 Empire Drive, Suite 355
St. Paul, MN 55103-3555

Annual money-weighted return on plan investments

For the year ended June 30, 2017, the annual money-weighted rate of return on the assets of the combined retirement fund, net of investment expense, was 15.18 percent (*Figure 6, 10-Year Schedule of Investment Returns using the Money-Weighted Method*). The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for the changing amounts actually invested.

Explanation of money-weighted return

The money-weighted rate of return is a method of calculating period-by-period returns on a pension plan investments that adjusts for the changing amounts actually invested. For purposes of GASB Statement 67, the money-weighted rate of return is calculated as the internal rate of return on pension plan investments, net of pension plan investment expense.

Figure 6. 10-Year Schedule of Investment Returns using the Money-Weighted Method

Year	Investment Return
FY2017	15.182%
FY2016	(0.118%)
FY2015	4.479%
FY2014	18.696%

Ten years are not available. Additional years will be provided when they become available.

D. Capital Assets

Capital assets are capitalized at the time of acquisition at cost. Assets with a cost in excess of $5,000 and internally generated software development costs in excess of $1,000,000 are capitalized. In fiscal year 2017, software development costs of $3,895,364 were capitalized. Additional development costs are anticipated in the next year.

Depreciation and amortization is computed on a straight-line method over the useful life of the related assets. The estimated useful lives by major category are: computer equipment (3 years), general office equipment (5 years), modular office furniture (10 years) and internally generated software (10 years).

Capital assets are presented on the June 30, 2017, Statement of Fiduciary Net Position. The year-end balance plus changes during the year are shown in *Figure 7, Schedule of Capital Assets*.

E. Accrued Compensated Absences

Employees of TRA accrue vacation leave, sick leave, and compensatory leave at various rates within limits specified in collective bargaining agreements. Accumulated amounts for compensated absences are accrued when incurred. Such leave is liquidated in cash primarily at the time of termination of employment. The total liability at June 30, 2017, is $933,018. Of this, $98,794 is considered a short-term liability and $834,224 is shown as a long-term liability on the Statement of Fiduciary Net Position. The total increased by $13,910 during fiscal year 2017.

Figure 7. Schedule of Capital Assets

Description	Balance 7/01/2016	Additions	Deletions	Balance 6/30/2017
Furniture and equipment	$ 2,344,556	$ 22,269	$ (30,789)	$ 2,336,036
Reserve for depreciation	(1,974,926)	(174,198)	-	(2,149,124)
Internally developed software	16,220,674	3,895,364	-	20,116,038
Reserve for amortization	$ (1,688,700)	$ (1,816,528)	-	$ (3,505,228)
Net Capital Assets	$ 14,901,604	$ 1,926,907	$ (30,789)	$ 16,797,722

3. Deposits and Investment Risk Disclosures

A. Fair Value Reporting

GASB Statement No. 72, Fair Value Measurement and Application, sets forth the framework for measuring the fair value of investments based on a hierarchy of valuation inputs. The hierarchy has three Levels:

Level 1: Market valuation approach using quoted prices (unadjusted) in active markets for identical assets or liabilities that the reporting entity can access at the measurement date.

Level 2: Market valuation approach using inputs other than quoted prices included in Level 1 that are observable for the asset or liability, either directly or indirectly. Inputs for Level 2 include:

- Quoted prices for similar assets or liabilities in active markets;
- Quoted prices for identical or similar assets or liabilities in inactive markets;
- Inputs other than quoted prices that are observable for the asset or liability;
- Inputs derived principally from or corroborated by observable market data by correlation or other means.

Level 3: Unobservable inputs for the asset or liability. Unobservable inputs reflect the SBI's assumptions about the inputs that market participants would use in pricing an asset or liability. Assets classified as a Level 3 typically use the cost approach, income approach, or consensus pricing for a valuation technique.

Net Asset Value (NAV): Investments that do not have a readily determinable fair value are measured using the NAV per share (or its equivalent) as a practical expedient, and are not classified in the fair value hierarchy.

Cash and cash equivalents (investments with less than 12 months to maturity) are not leveled per GASB 72.

All non-cash investments, including derivative investments that are not hedging derivatives, are required to be measured at fair value on a recurring basis. The SBI maintains investment pools that participants can invest in; participants own a proportionate share of the investment pools. The fair value of the investment pools is priced daily by the SBI custodian, when a daily price is available, by using independent pricing sources.

In *Figure 8, Fair Value of TRA Investments*, Level 3 investments primarily consist of assets where the asset is distressed, or there is not an active market. The fair value of the assets measured at NAV have been determined using the March 31, 2017, values, adjusted for cash flows. The investments measured at NAV are typically not eligible for redemption. Distributions are received as underlying investments within the funds are liquidated, which occur over the life of the investment.

The SBI has 20 investments that are valued at NAV that are currently in the liquidation mode, totaling 1 percent of the NAV value. The majority of the remaining value of investments in liquidation mode will be returned to the SBI within a time period of three to five years. TRA has a total of $1,970,843,340 in unfunded commitments to the investments valued at NAV. Unfunded commitments is money that has been committed to an investment but not yet transferred to the General Partner (Investor).

Explanations of investment types follow *Figure 8, Fair Value of TRA Investments*.

Figure 8. Fair Value of TRA Investments

As of June 30, 2017

Investments	Fair Value	Level 1	Level 2	Level 3
Equity				
Common Stock	$ 12,672,820	$ 12,608,136	$ 54,984	$ 9,700
Real Estate Investment Trust	398,926	398,586	-	340
Other Equity	406,987	299,930	29,383	77,674
Equity Total	$ 13,478,733	$ 13,306,652	$ 84,367	$ 87,714
Fixed Income				
Asset-Backed Securities	$ 23,242	-	$ 23,242	-
Mortgage-Backed Securities	1,318,340	-	1,303,693	14,647
Corporate Bonds	1,429,007	-	1,429,006	1
Government Issues	1,339,390	-	1,339,390	-
Other Debt Instruments	211,024	-	205,592	5,432
Fixed Income Total	$ 4,321,003	-	$ 4,300,923	$ 20,080
Investment Derivatives				
Options	156	156	-	-
Derivative Total	$ 156	$ 156		
Total Investments by Fair Value	$ 17,799,892	$ 13,306,808	$ 4,385,290	$ 107,794

Investments Measured at the Net Asset Value (NAV)	NAV	Unfunded Commitments
Private Equity	$ 1,677,168	$ 1,326,140
Real Estate	184,360	159,684
Resource	624,997	237,688
Yield Oriented	239,119	247,331
NAV total	$ 2,725,644	$ 1,970,843

Note: *Cash, cash equivalents, and derivative futures (hedge type instruments) are not leveled under GASB Statement 72, so are not included in this figure. Any variance between recorded account balances and the fair value of investments as reported in the exhibit are accounts payable and accounts receivable items on June 30, 2017, and not leveled under GASB Statement No. 72.*

Investment types used in Figure 8:

Equity

Common Stock: Securities representing equity ownership in a corporation, providing voting rights, and entitling the holder to a share of the company's success through dividends and/or capital appreciation.

Real Estate Investment Trust (REIT): An investment pool established by a group of investors for the purpose of investing in real estate or mortgages. REITs are generally exempt from federal taxes, provided that 95 percent of earned income is distributed and that the various investors are not treated differently.

Other Equity:

Common Stock Unit: A combination of more than one equity issue sold and traded as a package, usually a combination of common shares and warrants.

Depository Receipts: Certificates issued by a depository bank, representing foreign Shares held by the bank, usually by a Branch or Correspondent in the country of issue. One American depository receipt (ADR) may represent a portion of a foreign share, one share, or a bundle of shares of a foreign corporation. If the ADRs are "sponsored," the Corporation provides financial information and other assistance to the bank and may subsidize the administration of the ADR. "Unsponsored" ADRs do not receive such assistance.

Limited Partnership Units: Units of a Partnership that include one or more partners who have limited liability.

Mutual Funds: An open-ended fund operated by an investment company which raises money from shareholders and invests in a group of assets, in accordance with a stated set of objectives.

Non Security Asset (Equity): Long term instruments that do not have an actual certificate issued for them, but have equity characteristics. Examples include insurance policies, commodities, and escrow accounts.

Preferred Stock: Capital stock which provides a specific dividend that is paid before any dividends are paid to common stock holders, and which takes precedence over common stock in the event of a liquidation.

Rights: The right to purchase newly issued securities in proportion to an investor's holdings of certain stocks. Generally, they are actively traded and must be exercised within a short period of time.

Warrants: The right to purchase one or more shares of stock. Warrants are usually attached to other issues purchased by an investor. They are often detachable and can be exercised over a long period (five to ten years). A warrant, because it has a value of its own, can be traded.

Fixed Income

Asset Backed Securities: Auto Loan Receivable is the second largest subsector in the asset-backed security (ABS) market is auto loans. Auto finance companies issue securities backed by underlying pools of auto-related loans. Auto ABS are classified into three categories: prime, nonprime, and subprime. Prime auto ABS are collateralized by loans made to borrowers with strong credit histories, Nonprime auto ABS consist of loans made to lesser credit quality consumers, which may have higher cumulative losses. Subprime borrowers will typically have lower incomes, tainted credited histories, or both. Owner trusts are the most common structure used when issuing auto loans and allow investors to receive interest and principal on sequential basis. Deals can also be structured to pay on a pro-rata or combination of the two.

Mortgage Backed Securities:

Collateralized Mortgage Obligation (CMO) is a mortgage-backed, investment-grade bond that separates mortgage pools into different maturity classes. CMOs are backed by mortgage-backed securities with a fixed maturity.

Federal Home Loan Mortgage Corporation (FHLMC): A private corporation (also known as Freddie Mac) that was developed by congress in order to help support the secondary mortgage market. Like Fannie Mae, Freddie Mac purchases loans from lenders so lenders have additional funds that enable them to make more home loans to homebuyers.

Federal National Mortgage Association (FNMA): Also known as Fannie Mae, FNMA is the largest non-bank financial services company in the world. This federally-sponsored private company purchases conventional mortgages and mortgages that are insured by the federal government in order to allow lenders to clear up funds in order to make additional home loans to more homebuyers.

Government National Mortgage Association (GNMA I): A government owned corporation (nicknamed Ginnie Mae) with the authority to fully guarantee the full and timely payment of all monthly principal and interest payments on the mortgage backed securities

Government National Mortgage Association (GNMA II): A government owned corporation (Ginnie Mae) with the authority to fully guarantee the full and timely payment of all monthly principal and interest payments on the mortgage backed securities collateralized by registered holders.

Corporate Bonds: Debt obligations issued by corporations as an alternative to offering equity ownership by issuing stock. Like most municipal bonds and Treasuries, most corporate bonds pay semi-annual interest and promise to return their principal when they mature. Maturities range from 1 to 30 years.

Government Issues: Government issued security/bond.

Other Debt Instruments:

Other (includes Other Asset Backed): There are many other cash-flow-producing assets, including manufactured housing loans, equipment leases and loans, aircraft leases, trade receivables, dealer floor plan loans, and royalties. Intangibles are another emerging asset class.

Municipals: Bonds issued by any of the fifty states, the territories and their subdivisions, counties, cities, towns, villages and school districts, agencies (such as authorities and special districts created by the states), and certain federally sponsored agencies such as local housing authorities. Historically, the interest paid on these bonds has been exempt from federal income taxes and is generally exempt from state and local taxes in the state of issuance.

Credit Card Receivables: Securities backed by credit card receivables have been benchmark for the ABS market. Credit card holders may borrow funds on a revolving basis up to an assigned credit limit. The borrowers then pay principal and interest as desired, along with the required minimum monthly payments.

Asset-backed securities backed by credit card receivables are issued out of trusts that have evolved over time from discrete trusts to various types of master trusts of which the most common is the de-linked master trust. Discrete trusts consist of a fixed or static pool of receivables that are tranched into senior/subordinated bonds.

STIF Type Instrument: Short-term investment funds include cash, bank notes, corporate notes, government bills and various safe short-term debt instruments. These types of funds are usually used by investors who are temporarily parking funds before moving them to another investment that will provide higher returns. These funds traditionally have low management fees, usually well below 1 percent per year.

Investment Derivatives

Options – Futures: A contract that gives the holder the right to buy from or sell to the writer a specified amount of securities at a specified price, good for a specified period of time. An American option can be exercised at any time prior to its expiration. A European option can be exercised only on its expiration date.

Investments Measured at the Net Asset Value (NAV)

Private Equity: The private equity investment strategy is to establish and maintain a broadly diversified private equity portfolio composed of investments that provide diversification by industry type, stage of corporate development and location. The SBI has 122 Private Equity investments representing 61 percent of the NAV value.

Real Estate: The real estate investment strategy calls for the establishment and maintenance of a broadly diversified real estate portfolio composed of investments that provide overall diversification by property type and location. The main components of this portfolio consist of investments in closed-end commingled funds. The remaining portion of the portfolio may include investments in less diversified, more focused (specialty) commingled funds and REITs. The SBI has 17 Real Estate investments representing 7 percent of the NAV value.

Resource Funds: The strategy for resource investments is to establish and maintain a portfolio of resource investment vehicles that provide an inflation hedge and additional diversification. Resource investments will include oil and gas investments and energy service industry investments that are diversified by geographic area as well as by type. The SBI has 33 Resource Funds' investments representing 23 percent of the NAV value.

Yield Oriented: The strategy for yield-oriented investments is to target funds that typically provide a current return and may have an equity component. Structures such as subordinated debt investments and mezzanine investments are typical yield-oriented investments. The SBI has 30 Yield Oriented Funds' investments representing 9 percent of the NAV value.

B. Investment Risk

The Minnesota State Board of Investment (SBI) is responsible for the investing of TRA assets under the authority of Minnesota Statutes, section 11A.24. The following disclosures apply to TRA investments.

C. Custodial Credit Risk

Custodial credit risk for cash deposits and investments is the risk that, in the event of a bank or custodian failure, TRA will not be able to recover the value of its investments or collateral securities. Cash consists of year-end receipts not processed as of the investment cutoff deadline on June 30. TRA cash funds are held in the state treasury, commingled with other state funds. Minnesota Statute Sec. 9.031, requires that deposits be secured by depository insurance or a combination of depository insurance and collateral securities held in the state's name by an agent of the state. Such insurance and collateral shall be in amounts sufficient to ensure that deposits do not exceed 90 percent of the sum of the insured amount and the market value of the collateral. Throughout fiscal year 2017, the combined depository insurance and collateral was sufficient to meet legal requirements and secure all TRA deposits, eliminating exposure to custodial credit risk.

D. Credit Risk

Credit risk is the risk that an issuer or counterparty to an investment will be unable to fulfill its obligations. The State Board of Investment (SBI) has policies designed to minimize credit risk. They may invest funds in governmental obligations provided the issue is backed by the full faith and credit of the issuer or the issue is rated among the top four quality rating categories by a nationally recognized rating agency. They may invest funds in corporate obligations provided the issue is rated among the top four quality categories by a nationally recognized rating agency. They may also invest in unrated corporate obligations or in corporate obligations that are not rated among the top four quality categories provided that:

- The aggregate value of these obligations may not exceed 5 percent of the fund for which the state board is investing;
- Participation is limited to 50 percent of a single offering; and
- Participation is limited to 25 percent of an issuer's obligations.

SBI may also invest in bankers acceptances, deposit notes of U.S. banks, certificates of deposit, mortgage securities, and asset backed securities rated in the top four quality categories by a nationally recognized rating agency. Commercial paper must be rated in the top two categories.

The SBI invests in implicitly guaranteed items of the U.S. Government, which include the following:

- Federal Home Loan Bank (FHL Banks)
- Federal National Mortgage Association (Fannie Mae)
- Federal Home Loan Mortgage Corporation (Freddie Mac)
- Financing Corporation (FICO)
- Federal Farm Credit Banks (FCBanks)
- Federal Agricultural Mortgage Corporation (Farmer Mac)
- SLM Corporation (Sallie Mae)

The SBI uses both Moody's and S&P to obtain ratings. If both agencies have a rating for a security, the SBI uses the lower of two ratings. If a security is rated by only one of the rating agencies, that rating will be used. In a review of the implicitly guaranteed items of the Federal Government as listed above, we found that 8 percent were rated by either Moody's or S&P. The remaining 92 percent are assigned to the Agency category.

The implicitly guaranteed items make up 83 percent of the total Agency rating category. Implicitly guaranteed items with an Agency rating category are in the following security types:

- Agency
- Asset Backed
- Cash Equivalent
- Collateral Mortgage Obligations
- Corporate
- Mortgage Pass Through

Figure 9. Credit Risk Exposure

Quality Rating	Fair Value
AAA	$ 220,058,617
AA	138,244,072
A	228,277,425
BBB	738,157,530
BB	434,494,821
B	43,834,758
CCC	10,718,668
CC	9,318,418
C	2,377,423
D	2,542,204
Agency	1,128,115,968
Treasury	1,144,108,601
Unrated	1,019,878,376
Total	$5,120,126,881

E. Concentration of Credit Risk

Concentration of credit risk is the risk of loss that may be attributed to the magnitude of an investment in a single issuer. SBI determines concentration of credit risk based on security identification number.

TRA does not have exposure to a single issuer that equals or exceeds five percent; therefore, there is no material concentration of credit risk.

F. Interest Rate Risk

Interest rate risk is the risk that changes in interest rates of debt instruments, which could adversely affect the fair value of an investment. The State Board of Investment controls interest rate risk through guidelines developed for each portfolio. TRA's share of the debt securities are held in external investment pools and have the weighted average maturities as shown in *Figure 10, Interest Rate Risk*.

Figure 10. Interest Rate Risk

Security Type	Weighted Average Maturity (in Years)
Foreign Country Bonds	17.75
Municipal	16.50
U.S. Treasury	9.61
Corporate Debt	9.02
Yankee	7.77
Commercial Mortgage Backed Securities	4.22
Agency	5.19
Collateralized Mortgage Obligation	5.16
Mortgage Pass Through	5.06
Asset Backed	2.80
Cash Equivalent	0.28

G. Foreign Currency Risk

Foreign currency risk is the risk that changes in exchange rates between the U.S. dollar and foreign currencies could adversely affect the fair value of an investment. Under SBI manager guidelines, approved by the Investment Advisory Committee (IAC) and SBI, each money manager may hedge foreign currency transactions at their own option. Government obligations, including guaranteed or insured issues of the International Bank for Reconstruction and Development, the Inter-American Development Bank, the Asian Development Bank, and the African Development Bank, must pay interest and principal in U.S. dollars. The principal and interest of obligations of corporations, including those corporations incorporated or organized under the laws of the Dominion of Canada or any province thereof, must also be paid in U.S. dollars. TRA's share of investments as of June 30, 2017, was distributed among the currencies as shown in *Figure 11, Schedule of Foreign Currency Risk*.

Figure 11. Schedule of Foreign Currency Risk

Currency	Cash	Fixed Income or Debt	Equity	Total
Australian Dollar	$ 2,904,152	$ –	$ 206,595,072	$ 209,499,224
Brazilian Real	18,359	–	52,289,286	52,307,645
Canadian Dollar	3,005,027	158,122	280,742,969	283,906,118
Chilean Peso	2,417	–	5,752,361	5,754,778
Colombian Peso	8,348	–	2,769,196	2,777,544
Czech Koruna	29,069	–	5,477,113	5,506,182
Danish Krone*	48,176	–	67,506,197	67,554,373
Egyptian Pound	12,168	–	1,571,914	1,584,082
Euro Currency	3,167,043	269,554	1,260,993,467	1,264,430,064
Hong Kong Dollar	1,729,255	–	300,142,526	301,871,781
Hungarian Forint	0	–	8,114,987	8,114,987
Indian Rupee	139,883	–	47,061,585	47,201,468
Indonesian Rupiah	9,812	–	30,100,144	30,109,956
Japanese Yen	4,637,834	7,465,233	729,412,156	741,515,223
Malaysian Ringgit	81,835	–	19,700,422	19,782,257
Mexican Peso	352,072	–	30,737,010	31,089,082
Moroccan Dirham	12	–	0	12
New Israeli Sheqel	23,984	–	9,349,732	9,373,716
New Taiwan Dollar	(217,868)	–	108,172,192	107,954,324
New Zealand Dollar	6,562	–	6,134,505	6,141,067
Norwegian Krone	42,398	–	25,799,322	25,841,720
Philippine Peso	515	–	12,666,033	12,666,548
Polish Zloty	3,259	–	13,647,963	13,651,222
Pound Sterling	7,310,995	7,278,607	557,655,493	572,245,095
Qatari Rial	319	–	2,352,852	2,353,171
Singapore Dollar	547,097	–	38,554,076	39,101,173
South African Rand	36,576	–	50,019,970	50,056,546
South Korean Won	(5,819)	–	146,015,689	146,009,870
Swedish Krona	(6,588)	–	85,416,361	85,409,773
Swiss Franc	267,022	–	252,132,652	252,399,674
Thailand Baht	(323)	–	19,274,064	19,273,741
Turkish Lira	15,195	–	13,248,411	13,263,606
UAE Dirham	1,017	–	3,671,128	3,672,145
Total	**$ 24,169,803**	**$ 15,171,516**	**$ 4,393,076,848**	**$ 4,432,418,167**

** Timing issues resulted in an overdrawn account and negative cash and cash equivalents.*

H. Derivative Financial Instruments

Governmental Accounting Standards Board (GASB) Statement 53 Disclosures

On behalf of TRA, SBI invests in various types of derivative financial instruments. Derivatives are financial instruments, the value of which are derived, in whole or in part, from the value of any one or more underlying securities or assets, or index of securities or assets.

Minnesota Statutes, section 11A.24, provides that any agreement for put and call options and futures contracts may only be entered into with a fully offsetting amount of cash or securities. This applies to foreign currency forward contracts used to offset the currency risk of a security. All other derivatives are exchange-traded. The purpose of the SBI's derivative activity is to equitize cash in the portfolio, to adjust the duration of the portfolio, or to offset current futures positions.

Explanations of each derivative instrument type are presented below. The fair value balances and notational amounts (or face value) at June 30, 2017, classified by derivative instrument type (e.g., futures, options, currency forwards, and stock warrants and rights), and the changes in fair value for fiscal year 2017 are shown in *Figure 12, Schedule of Derivative Financial Instruments*.

- **Futures** are contract commitments to purchase (asset) or sell (liability) at a future date. The net change in the values of futures contracts is settled on a regular basis and gains and losses are included in investment income.
- **Options** are contracts that give buyers or sellers the right to buy (calls) or sell (puts) a security at a predetermined price on a future date. Gains and losses result from variances in the market value of the security that is the subject of the contract that occur prior to or on the contract specified date. The gains and losses are included in investment income.
- **Currency Forward Contracts** are used to manage portfolio foreign currency risk. The provisions of the contract vary based on what is negotiated between the two parties.
- **Stock Warrants and Rights**, similar to options, are the right to purchase shares of a stock at a certain price by a certain date. They usually have a longer term before expiration, e.g., five years or more. When exercised, new shares are issued by the company. Rights are the same but are issued to current stock owners to enable them to retain their relative ownership share. Gains and losses from the sale or exercise of stock warrants and rights are included in investment income.

SBI is exposed to credit risk through multiple counterparties in foreign currency forward contracts that are used to offset the currency risk of a security. TRA's proportionate share of the maximum loss that SBI would have recognized as of June 30, 2017, if all counter parties failed to perform as contracted is $744,250. These counter parties have S&P ratings of BBB+ or better. There is no collateral held or any liabilities included in netting arrangements with those counterparties that would have reduced SBI's exposure to credit risk.

Figure 12. Schedule of Derivative Financial Instruments
(in thousands of dollars)

Derivative Investment Type	Changes in Fair Value During FY 2017	Fair Value at June 30, 2017	Notional Amount
Futures			
Index Futures – Long	$ 19,841	$ -	$ 1,406
Index Futures – Short	$ (1,865)	$ -	$ (25)
Fixed Income Futures – Long	$ (3,067)	$ -	$ 226,007
Fixed Income Futures – Short	$ 11,168	$ -	$ (359,352)
Options			
Futures Options Bought	$ (1,450)	$ 208	$ 879
Futures Options Written	$ 1,832	$ (52)	$ (447)
Currency Forwards			
Foreign Currency Forwards	$ 1,201	$ (392)	$ 123,373
Stock Warrants and Rights			
Stock Warrants	$ 72	$ 1,163	$ 9
Stock Rights	$ 381	$ 192	$ 319

I. Securities Lending

Governmental Accounting Standards Board (GASB) Statement 28 Disclosures

TRA does not own specific securities, but instead owns shares in pooled funds invested by SBI. The SBI is authorized to use securities lending transactions in accordance with Minnesota Statutes, section 356A.06, subdivision 7, and has, pursuant to a Custodial Trust Agreement, authorized State Street Bank and Trust Company, Boston, Massachusetts, to act as agent in lending securities to approved borrowers.

During the fiscal year, State Street lent, at the direction of the SBI, certain securities held by State Street as custodian and received cash (United States and foreign currency) or other collateral including securities issued or guaranteed by the United States government. State Street did not have the ability to pledge or sell collateral securities absent a borrower default. Under Minnesota Statutes, section 11A.24, borrowers were required to deliver collateral for each loan in amounts at least equal to the market value of the loaned securities.

SBI did not impose any restrictions during the fiscal year on the amount of the loans that State Street made on its behalf. There were no failures by any borrowers to return loaned securities or pay distributions thereon during the fiscal year. Moreover, there were no losses during the fiscal year resulting from a default of the borrowers or State Street.

During the fiscal year, SBI and the borrowers maintained the right to terminate all securities lending transactions on demand. The cash collateral received on each loan was invested in a separate investment pool. As of June 30, 2017, such investment pool had an average duration of 13.08 days and an average weighted maturity of 115.06 days. Because the loans were terminable at will, their duration did not generally match the duration of the investments made with cash collateral. On June 30, 2017, SBI had no credit risk exposure to borrowers. TRA's portion of the market value of the collateral held and the fair value of securities on loan from SBI as of June 30, 2017, were $4,835,122,241 and $4,622,078,820, respectively. Cash collateral totaling $2,182,398,978 is reported on the Statement of Fiduciary Net Position as an asset. Liabilities resulting from these securities lending transactions are also reported on the Statement of Fiduciary Net Position.

4. Other Notes

A. Administrative Expenses and Budget

The annual budget of TRA operations is developed by TRA management and approved by the Board of Trustees. The budget is also sent to the Department of Minnesota Management & Budget for policy analysis and is included in the Governor's Biennial Budget presentation to the legislature. The legislature adopts appropriation and expenditure amounts resulting in an approved budget for the Association.

TRA administrative costs are not financed by any specific type of contribution or other income of the Fund. Administrative costs are budgeted in the annual determination of the actuarial required contribution rate (page 96, line B3).

B. Earnings Limitation Savings Account (ELSA)

Teachers under their Social Security normal retirement age who resume teaching service for a TRA-covered employer after retirement are subject to a $46,000 annual earnings limitation. If a retired member earns more than the limitation, the annuity payable during the following calendar year will be offset one dollar for each two dollars earned in excess of the limitation.

The pension offset amounts are redirected to a separate individual savings account, called the Earnings Limitation Savings Account (ELSA), and later distributed to the retiree. Effective January 1, 2011, ELSA accounts no longer accrue interest. A member may apply for a lump-sum payment or rollover of their ELSA account balance, as long as it has been at least one year after the last deferred amount was redirected to the ELSA account.

As of June 30, 2017, TRA had 317 retirees with an ELSA account established. The total of all ELSA account balances was $4.6 million. The dollar amount of pension benefits withheld due to excess earnings during fiscal year 2017 was $1,994,842. ELSA assets are invested in the TRA Fund until distribution. Distributions of ELSA accounts for 139 retirees occurred during fiscal year 2017 and totaled $1.71 million and are included as a deduction in the Statement of Changes in Fiduciary Net Position as a component of Refund of Contributions to Members.

C. Participating Pension Plan

All 90 employees of the Teachers Retirement Association are covered by the multiple employer cost sharing defined benefit plan administered by TRA. All TRA employees participate in the Coordinated Plan and are eligible for the plan provisions described in Note 1, C.

Minnesota Statutes section 354.42 sets the rates for the employee and employer contributions. These statutes are established and amended by the state legislature. During fiscal year 2017, Coordinated members were required to contribute 7.5 percent of their annual covered salary. Employers contributed 7.5 percent of their annual covered salary for Coordinated members. The total covered payroll salaries for all TRA employees during fiscal year 2017 was approximately $4.8 million or 0.1 percent of total membership-covered salaries. The total covered payroll salaries for the entire membership of TRA for fiscal year 2017 was approximately $4.7 billion. TRA paid 100 percent of its required employer contributions listed in *Figure 13*.

Figure 13. Schedule of TRA Employer Pension Contributions for TRA Employees

2017	2016	2015
$347,196	$341,963	$329,098

D. Ownership of Office Building

The 1999 Legislature enacted authorization permitting TRA, the Public Employees Retirement Association (PERA), and the Minnesota State Retirement System (MSRS) to purchase land and construct a 140,000 square foot office building to house the administrative offices of these three state entities. Ownership of the facility is prorated based on the amount of square footage each retirement fund occupies in the building.

Effective July 1, 2015, TRA's ownership interest decreased from 36.7 percent to 36.0 percent.

The building is located on 4.3 acres of land at 60 Empire Drive in Saint Paul. TRA has occupied the 4th Floor of the building since September 2001.

In June 2000, the State of Minnesota, under the authority of the Commissioner of Minnesota Management and Budget, issued 30-year revenue bonds totaling $29 million to pay for the construction of the facility. Each owner (retirement fund) is responsible for principal and interest payments based on its ownership percentage.

In August, 2012, the bonds were refunded with the proceeds of a new, lower-interest rate bond issue. The 2013 series $21,880,000 Retirement System Revenue Refunding bonds are secured by the value of the total assets of the retirement systems, excluding any fund related to or dedicated to defined contribution plans administered by the retirement systems. The goal of the 2012 refunding bonds was not only to attempt to approximate the debt service payments that had existed under the 2000 revenue bonds, but to also shorten the repayment period by five years.

Through the issuance of the refunding bonds, which received a AAA rating from both Standard & Poor's and Fitch, the bond term was reduced by five years and the present value of the savings to the retirement systems was $9.58 million. The bonds mature on June 1, 2025. TRA's share of the present value savings of the 2012 bond issuance was approximately $3.51 million.

At fiscal year end, TRA's share of the bonds payable is $5,604,192, which includes bond principal of $4,941,000 and bond premium of $306,815. Interest expected to be paid over the remaining term of the bonds is $356,377. TRA's share of the long-term bond repayment schedule including interest is summarized in *Figure 14*, *Schedule of Building Debt Service Payments*.

TRA is depreciating its share of the facility over 40 years. The depreciation schedule, shown in *Figure 15, Schedule of Office Building and Equipment,* summarizes the asset valuation of the office building, building equipment and deferred bond charges.

Figure 14. Schedule of Building Debt Service Payments

(TRA Share @ 36.0%) Effective: July 1, 2015				
Fiscal Year	**Principal**	**Interest**	**Premium**	**Total**
2018	615,600	81,924	51,168	748,692
2019	633,600	71,717	49,063	754,380
2020	642,600	61,212	46,896	750,708
2021	660,600	50,557	44,699	755,856
2022	675,000	39,604	42,440	757,044
2023	689,400	28,412	40,132	757,944
2024	664,200	16,982	23,986	705,168
2025	360,000	5,969	8,431	374,400
Totals	$4,941,000	$356,377	$306,815	$5,604,192

Figure 15. Schedule of Office Building and Equipment

(TRA Share @ 36.0%)				
Description	**Balance 7/01/2016**	**Additions**	**Deletions**	**Balance 6/30/2017**
Land	$ 171,166	$ -	$ -	$ 171,166
Building	10,637,059	-	$ -	10,637,059
Reserve for Building Depreciation	(4,137,266)	(259,992)	-	(4,397,258)
Net Building	$ 6,499,793	$ (259,992)	$ -	$ 6,239,801
Building Equipment	$ 107,752	$ -	$ -	$ 107,752
Reserve for Bld. Equip Deprec.	(85,095)	(11,328)	-	(96,423)
Net Building Equipment	$ 22,657	$ (11,328)	$ -	$ 11,329

E. Accounting and Financial Reporting by Employers for Postemployment Benefits Other Than Pensions

Nearly all TRA employees are covered by the State Employees Group Insurance Plan (SEGIP), a multiple employer cost-sharing defined benefit plan administered by the Department of Minnesota Management and Budget. At present, this plan subsidizes the cost of retiree insurance by charging a single premium rate for active employees and retirees, regardless of underwriting experience. As of June 30, 2017, the SEGIP had an unfunded net obligation of $331,513,000 to be funded on a pay-as-you-go basis. TRA's allocated portion of this liability is $98,000 as shown in Figure 16:

Figure 16. Required OPEB Contributions and Net OPEB Obligation

(dollars in thousands)

FY Ended June 30	Annual Required Contribution (a)	Employer Contribution (b)	Percent (b)/(a)	Net OPEB Obligation
2017	$47	$32	68%	$98
2016	$53	$36	68%	$83
2015	$51	$32	63%	$66
2014	$44	$36	82%	$47

5. Contributions Required and Made

The TRA actuary performs an annual actuarial funding valuation in accordance with Minnesota Statute and the Minnesota Legislative Commission on Pensions and Retirement's (LCPR) *Standards for Actuarial Work*. The report is meant to assist the legislature in determining the funding progress made towards paying off TRA's unfunded liabilities.

Minnesota Statutes, Chapter 354 sets the rates (page 96, Line A4) for employee and employer contributions. TRA also uses the level percentage of payroll method to amortize the fund's unfunded liability over a closed period ending June 30, 2039.

Contributions totaling $764,553,855 ($361,175,007 employee and $403,378,848 employer and employer direct aid) were received in accordance with the statutory contribution rates and amounts. On page 96, Line C, statutory contributions are projected as insufficient to meet the actuarially determined required contributions. The deficiency is 2.50 percent of covered payroll. This translates into a contribution deficiency of about $126.3 million projected for fiscal year 2018.

6. Net Pension Liability

TRA's actuarial consultant performs another actuarial valuation to comply with the requirements of GASB Statement 67.

The components of the net pension liability of the TRA plan as of June 30, 2017, are as follows for participating employers and nonemployers:

Net Pension Liability (in thousands)	
Total Pension Liability (TPL)	$ 41,219,904
Fiduciary Net Position (FNP)	$ 21,258,090
Net Pension Liability (NPL)	$ 19,961,814
Plan net position as a percentage of the total pension liability	51.57%

Key Methods and Assumptions Used in Valuation of Total Pension Liability	
Actuarial Information	
Price inflation	2.50 percent
Salary increases, including price inflation	2.85 to 8.85 percent for 10 years and 3.25 to 9.25 percent, thereafter
Wage growth rate	2.85 percent for 10 years and 3.25 percent, thereafter
Payroll growth rate	3.00 percent
Long-term rate of return, net of investment expense, including price inflation	7.50 percent
Municipal bond index rate	
Prior measurement date	3.01 percent
Measurement date	3.56 percent
Year FNP is projected to be deleted	2053
Single equivalent interest rate, net of investment expense, including price inflation	
Prior measurement date	4.66 percent
Measurement date	5.12 percent
Cost of living adjustment	Once the funded ratio reaches 90 percent on a fair (market) value basis for two consecutive years, the COLA is scheduled by statute to increase from 2.0 percent to 2.5 percent. Based on modeling of future valuation results assuming all assumptions are met in the future, the funded ratio is not projected to reach 90 percent within the 50-year projection period, so the COLA is not assumed to increase to 2.5 percent.
Mortality Assumptions Pre-retirement mortality rates were based on the RP-2014 white collar employee table, male rates set back 6 years and female rates set back 5 years. Generational projection uses the MP-2015 scale. Post-retirement mortality rates were based on the RP-2014 white collar annuitant table, male rates set back 3 years and female rates set back 3 years, with further adjustments of the rates. Generational projection uses the MP-2015 scale. Post-disability mortality rates were based on the RP-2014 disabled retiree mortality table, without adjustment.	

Discount Rate (SEIR)

The discount rate used to measure the TPL as of the Measurement Date was 5.12 percent. The projection of cash flows used to determine the discount rate was performed in accordance with GASB 67. On that basis, the FNP was projected to be depleted in 2053 and, as a result, the Municipal Bond Index Rate was used in the determination of the SEIR. The long-term expected rate of return of 7.50 percent on plan investments was applied to periods before 2053 and the Municipal Bond Index Rate of 3.56 percent was applied to periods on and after 2053, resulting in a SEIR of 5.12 percent. There was a change in the Municipal Bond Index Rate from the Prior Measurement Date (3.01 percent).

Projected Cash Flows

The projection of cash flows used to determine the discount rate assumed that plan contributions from members and employers will be made at the current contribution rates as set out in state statute and supplemental aid will be received as currently provided in statute.

- Employee contribution rates: 11.00 percent for Basic members and 7.50 percent for Coordinated members.
- Employer contribution rates: 11.50 percent for Basic members and 7.50 percent for Coordinated members. In addition, a supplemental amount equal to 3.64 percent of salary for active members of Special School District #1 until the Fund is fully funded.
- Supplemental aid: $3,256,410 every year until the amortization date of July 1, 2039, plus $32,331,000 every year until the Fund is fully funded.
- The TRA Board of Trustees has legislative authority to increase contribution rates at their discretion, subject to review by the Legislative Commission on Pensions and Retirement (referred to as the "contribution stabilizer"). Given that there is no past history or formal Board policy relating to the use of the contribution stabilizer option, no change in either the employee or employer contributions were considered in the projections. If future contribution rates were assumed to increase it would likely impact the determination of the SEIR.
- Administrative expenses in the prior year were projected forward with price inflation as an estimate for administrative expenses in current and future years. The portion of expenses in future years allocated to the current members was based on the proportionate share of covered payroll in each year for the remainder of the existing members to the total covered payroll for all members.

The FNP projections are based on TRA's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing basis reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the TRA Fund will actually run out of money, the financial condition of the TRA Fund, or TRA's ability to make benefit payments in future years.

Long-Term Rate of Return

The long-term expected rate of return on pension plan investments is reviewed regularly as part of the experience study. An experience study of the economic assumptions was prepared in 2017 that resulted in a recommendation to reduce the long-term rate of return to 7.50 percent. Generally, several factors are considered in evaluating the long-term rate of return assumption including long-term historical data, estimates inherent in current market data, and an analysis in which best-estimate ranges of expected future real rates of return (expected returns, net of investment expense and inflation) were developed using assumptions for each major asset class, as well as estimates of variability and correlations, provided by the State Board of Investment. These ranges were combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and then adding expected inflation. The assumption is intended to be a long-term assumption (30 to 50 years) and is not expected to change absent a significant change in the asset allocation, a change in the inflation assumption, or a fundamental change in the market that alters expected returns in future years.

Municipal Bond Rate

The SEIR (discount rate) determination uses the Municipal Bond Index Rate. The rate used is the monthly average of the Bond Buyers General Obligation 20-year Municipal Bond Index Rate, formerly published monthly by the Board of Governors of the Federal Reserve System. The rate was 3.01 percent on the Prior Measurement Date and 3.56 percent on the Measurement Date.

Periods of Projected Benefit Payments

Projected future benefit payments for all current plan members were projected through 2116.

Assumed Asset Allocation

The target asset allocation and best estimates of geometric real rates of return for each major asset class, as provided by the Minnesota State Board of Investment (SBI), are summarized in *Figure 4, Long-Term Expected Rate of Return*.

Sensitivity Rate Analysis

GASB 67 requires disclosures of the sensitivity of the NPL to changes in the discount rate. The range is plus 1 and minus 1 percent of the current discount rate determined.

Sensitivity of Net Pension Liability (NPL) to Changes in the Discount Rate

	1% Decrease (4.12%)	Current Discount Rate (5.12%)	1% Increase (6.12%)
NPL	$ 26,345,748	$ 19,961,814	$ 14,759,381

The complete *2017 Actuarial Valuation Accounting Report* is available at https://www.MinnesotaTRA.org/FORMSPUB/eepubs.html.

Required Supplementary Information

Schedule of Changes in the Employers' Net Pension Liability

For the Fiscal Year Ended June 30, 2017

(in thousands)

	2017	2016	2015
Total Pension Liability			
Service cost	$ 1,267,304	$ 438,938	$ 399,228
Interest	1,975,771	2,062,775	2,019,707
Benefit term changes	-	-	-
Differences between expected and actual experience *	(167,572)	(798)	7,113
Assumptions changes **	(3,355,602)	15,871,845	576,075
Benefit payments, including member refunds	(1,776,814)	(1,728,023)	(1,669,607)
Net change in Total Pension Liability	($ 2,056,913)	$ 16,644,737	$ 1,332,516
Total Pension Liability – beginning***	$ 43,276,817	$ 26,632,080	$ 25,299,564
Total Pension Liability – ending (a)	$ 41,219,904	$ 43,276,817	$ 26,632,080
Employer contributions	$ 367,791	$ 354,961	$ 340,208
Non-employer contributions-Direct Aid (State/City/District)	35,587	35,587	41,587
Employee contributions	361,175	347,256	334,826
Net investment income	2,855,218	(23,672)	887,280
Benefit payments, including member refunds	(1,776,814)	(1,728,023)	(1,669,607)
Administrative expenses	(11,702)	(11,338)	(11,509)
Other	2,404	3,569	3,550
Net Change in Plan Fiduciary Net Position	$ 1,833,659	$ (1,021,660)	$ (73,665)
Plan Fiduciary Net Position – beginning	$ 19,424,431	$ 20,446,091	$ 20,519,756
Plan Fiduciary Net Position - ending (b)	$ 21,258,090	$ 19,424,431	$ 20,446,091
Net Pension Liability - ending (a)-(b)	$ 19,961,814	$ 23,852,386	$ 6,185,989
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	51.57%	44.88%	76.77%
Covered Payroll	$ 4,688,875	$ 4,515,699	$ 4,306,426
Employers' Net Pension Liability as a percentage of covered payroll	425.73%	528.21%	143.65%

** Includes impact of date change for expected increase in COLA to 2.50 percent.*

*** 2017 assumption changes include $2,772,688 due to the change in the SEIR and $582,914 due to other assumption changes.*

**** 2015 beginning of period TPL and FNP do not match the 2014 end-of-period amounts due to the DTRFA merger.*

Note: *Schedule is intended to show 10-year trend. Additional years will be reported as they become available.*

Required Supplementary Information *(continued)*

Schedule of Changes in the Employers' Net Pension Liability

For the Fiscal Year Ended June 30, 2017

(in thousands)

2014
$ 367,621
1,895,469
-
475,265
-
(1,592,686)
$ 1,145,669
$ 23,755,943
$ 24,901,612
$ 299,300
21,001
294,632
3,257,693
(1,592,686)
(9,430)
3,855
$ 2,274,365
$ 18,019,319
$ 20,293,684
$ 4,607,928
81.50%
$ 4,056,482
113.59%

Note: *Schedule is intended to show 10-year trend. Additional years will be reported as they become available.*

Required Supplementary Information *(continued)*

Schedule of Employer and Non-Employer Contributions

For the Fiscal Year Ended June 30, 2017

(dollars in thousands)	**2017**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**	**2009**	**2008**
Actuarially determined employer contribution*	$ 516,582	$ 459,699	$495,235	$ 492,731	$ 463,788	$ 401,725	$ 384,943	$ 421,813	$ 355,189	$ 280,327
Actual non-employer contributions	$ 35,587	$ 35,587	$ 41,587	$ 21,001	$ 19,954	$ 21,726	$ 21,510	$ 21,550	$ 20,448	$ 21,845
Actual employer contributions	$ 367,791	$ 354,961	$340,208	$ 299,300	$ 270,708	$ 244,935	$ 222,723	$ 220,538	$ 220,270	$ 209,717
Total contributions	$ 403,378	$ 390,548	$381,795	$ 320,301	$ 290,662	$ 266,661	$ 244,233	$ 242,088	$ 240,718	$ 231,562
Annual contribution deficiency (excess)	$ 113,204	$ 69,151	$113,440	$ 172,430	$ 173,126	$ 135,064	$ 140,710	$ 179,725	$ 114,471	$ 48,765
Covered-employee payroll	$4,688,875	$4,515,699	$4,306,426	$4,056,482	$3,917,310	$3,871,809	$3,838,111	$3,787,757	$3,761,484	$3,645,230
Actual contributions as a percent of covered-employee payroll	8.60%	8.65%	8.87%	7.90%	7.42%	6.89%	6.36%	6.39%	6.40%	6.35%

** The 2015 actuarially determined employer contribution includes the required amount for both DTRFA ($11,039) and TRA ($484,196).*

Schedule of Investment Returns

Annual money-weighted rates of return net of investment expense.

Teachers Retirement Association Plan – FY 2017	15.18%
Teachers Retirement Association Plan – FY 2016	(0.12%)
Teachers Retirement Association Plan – FY 2015	4.48%
Teachers Retirement Association Plan – FY 2014	18.70%

Note: *Schedule is intended to show 10-year trend. Additional years will be reported as they become available.*

Notes to Required Supplementary Information for the Fiscal Year Ended June 30, 2017

Changes of Benefit and Funding Terms

The following changes were made by the Minnesota Legislature and reflected in the valuation performed as of July 1:

2017	None
2016	None
2015	The Duluth Teachers Retirement Fund Association was merged into TRA on June 30, 2015. This resulted in an additional state-provided contribution stream of $14.377 million until TRA becomes fully funded.
2014	The increase in the post-retirement benefit adjustment will be made once the fund is 90 percent funded for two consecutive years, rather than just one year. Legislation provided for the merger of the Duluth Teachers Retirement Fund Association into TRA. The merger will not occur until June 30, 2015, so it had no impact on the July 1, 2014, valuation results.
2013	The early retirement reduction factors applicable for Level formula benefits to plan members were changed.
2010	The post-retirement benefit increases were suspended for 2011 and 2012, resuming in 2013 at 2.0 percent, and returning to 2.5 percent once the funding ratio of the plan reaches 90 percent. Also in 2010, changes were made to the interest rate credited on employee contributions, future increases on deferred vested benefits, and the requirement to receive a full post-retirement benefit adjustment. In addition, employee and employer contribution rates were increased 0.50 percent per year beginning July 1, 2011, through July 1, 2014. The legislation also created the "stabilizer," whereby the Board was also granted authority to adjust contribution rates under certain circumstances.
2006	The benefit multiplier for Coordinated members was increased, employee contribution rates were increased, and the deferred benefit increase rate was reduced.

Changes in Actuarial Assumptions

7/1/2017 Valuation	The Cost of Living Adjustment was assumed to increase from 2.0 percent annually to 2.5 percent annually on July 1, 2045. Adjustments were made to the combined service annuity loads. The active load was reduced from 1.4 percent to 0.0 percent, the vested inactive load increased from 4.0 percent to 7.0 percent and the non-vested inactive load increased from 4.0 percent to 9.0 percent. For GASB valuation: • The investment return assumption was changed from 8.00 percent to 7.50 percent. • The COLA was not assumed to increase to 2.5 percent, but remain at 2.0 percent for all future years. • The price inflation assumption was lowered from 2.75 percent to 2.50 percent. • The payroll growth assumption was lowered from 3.50 percent to 3.00 percent.

	• The general wage growth assumption was lowered from 3.50 percent to 2.85 percent for 10 years followed by 3.25 percent, thereafter. • The salary increase assumption was adjusted to reflect the changes in the general wage growth assumption.
7/1/2016 Valuation	The Cost of Living Adjustment was not assumed to increase for funding or GASB calculation (it remained at 2.0 percent for all future years). The price inflation assumption was lowered from 3.00 percent to 2.75 percent. The general wage growth and payroll growth assumptions were lowered from 3.75 percent to 3.50 percent. Minor changes as some durations for the merit scale of the salary increase assumption. The pre-retirement mortality assumption was changed to the RP-2014 white collar employee table, male rates set back 6 years and female rates set back 5 years. Generational projection uses the MP-2015 scale. The post-retirement mortality assumption was changed to the RP-2014 white collar annuitant table, male rates set back 3 years and female rates set back 3 years, with further adjustments of the rates. Generational projection uses the MP-2015 scale. The post-disability mortality assumption was changed to the RP-2014 disabled retiree mortality table, without adjustment. Separate retirement assumptions for members hired before or after July 1, 1989, were created to better reflect each group's behavior in light of different requirement for retirement eligibility. Assumed termination rates were changed to be based solely on years of service in order to better fit the observed experience. A minor adjustment and simplification of the assumption regarding the election of optional form of annuity payment at retirement were made.
7/1/2015 Valuation	The cost-of-living (COLA) adjustment was assumed to increase from 2.0 percent annually to 2.5 percent annually on July 1, 2037, for funding calculations. The COLA was not assumed to increase for GASB calculations. The investment return assumption was changed from 8.25 percent to 8.00 percent.
7/1/2014 Valuation	Post-retirement benefit adjustments are now assumed to increase from 2.0 percent annually to 2.5 percent annually once the legally specified criteria are met. This is estimated to occur July 1, 2034 for GASB calculations and July 1, 2031 for funding calculations.
7/1/2012 Valuation	The investment return assumption was changed from 8.5 percent for all years to 8.0 percent for the next five years and 8.5 percent thereafter. This applies to funding calculations only.
7/1/2011 Valuation	The salary increase assumption was changed to a service based assumption. The payroll growth assumption was decreased from 4.00 percent to 3.75 percent. The post-retirement mortality assumption was changed to the RP-2000 Mortality Tables, with white-collar adjustments and male rates set back two years and female rates set back three years.

	The disabled mortality assumption was changed to the RP-2000 Disabled Retiree Mortality Tables. Assumed disability rates were changed to more closely reflect actual experience. Assumed retirement rates for Coordinated members were changed to more closely reflect actual experience. Assumed form of annuity selection was changed to more closely reflect actual experience. Assumed difference in ages between spouses was changed to more closely reflect actual experience.
7/1/2008 Valuation	Ultimate salary increase rates were lowered. The payroll growth assumption was lowered. Retirement rates were revised.

Method and Assumptions Used in Calculations of Actuarially Determined Contributions

TRA is funded with contributions from members and their employers. The actuarially determined contributions in the *Schedule of Employer and Non-Employer Contributions* on page 48 are calculated as of the beginning of the fiscal year in which contributions were reported.

The following methods and assumptions were used to calculate the actuarially determined employer contributions reported for the most recent Measurement Date, June 30, 2017, based on the July 1, 2016 valuation).

Actuarial cost method	Entry Age Normal
Amortization method	Level percentage of payroll, closed
Remaining amortization period	23 years
Asset valuation method	5-year moving average
Inflation	2.75 percent
Wage growth rate	3.50 percent
Salary increase, including inflation	3.50 to 9.50 percent
Long-term rate of return, net of investment expense including price inflation	8.47 percent compounded annually to reflect an 8.00 percent assumption for two years and 8.50 percent thereafter
Cost of living adjustment	2.00 percent per year, increasing to 2.50 percent on July 1, 2037

Please see the information presented earlier for detailed information on the benefit changes and assumption changes that may have impacted the Actuarially Determined Contributions shown in the *Schedule of Employer and Non-Employer Contributions on page 48*.

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Supporting Schedules to Financial Section

Teachers Retirement Fund
Administrative Expenses

For the Fiscal Year Ended June 30, 2017

Personnel Services		
Salaries	$	4,806,734
Employer contributions to Teachers Retirement Association		347,196
Employer contributions to Social Security		340,610
Insurance contributions		914,682
Employee training		69,409
Workers' compensation		3,519
Subtotal	$	6,482,150
Communication		
Duplicating and printing expenses	$	68,693
Postage		310,272
Telephone		80,960
Subtotal	$	459,925
Office Building Maintenance		
Lease of office and storage space	$	159,255
Building operating expenses		475,543
Rental of office machines/furnishings		93,365
Repairs and maintenance		215,430
Building equipment depreciation		11,329
Building depreciation		259,992
Bond interest expense		91,089
Subtotal	$	1,306,003
Professional Services		
Actuarial services	$	223,547
Audit fees		147,724
Legal fees		14,358
Management consultant services		4,024
Medical services		1,762
Subtotal	$	391,415
Other Operating Expenses		
Computer and system services	$	871,702
Department head expenses		1,499
Depreciation of office equipment		174,197
Dues and subscriptions		20,230
Insurance expense		5,659
Miscellaneous administrative expenses		31,251
Amortization		1,816,528
State indirect costs		6,658
Office supplies		30,181
Travel - director and staff		62,165
Travel - trustees		11,844
Loss on disposal of assets		30,789
Subtotal	$	3,062,703
Total Administrative Expenses	$	11,702,196

Teachers Retirement Fund
Schedule of Professional Consultant Expenses

For the Fiscal Year Ended June 30, 2017

Investment Pool Managers		
State Board of Investment	$	1,153,425
Callan Investment		178,603
Pension Consultants		32,598
QED		100,663
Domestic equity pool managers		6,619,640
Global equity pool managers		7,742,449
Domestic bond pool managers		3,825,939
Semi-passive equity pool managers		2,092,124
Passive equity pool managers		314,593
Total investment pool managers	$	22,060,034
Actuarial		
Cavanaugh Macdonald Consulting	$	208,247
Deloitte		15,300
Total Actuarial Expenses	$	223,547
Audit		
Legislative auditor	$	71,325
State auditor		76,399
Total audit expenses	$	147,724
Computer Support Services		
Fulcrum Consulting	$	1,057,554
International Projects Consultancy		181,440
SDK Software		31,648
Talent Software		195,520
Sogheti USA		105,030
Performix Business Services		6,120
Hollstadt & Associate		82,538
Total computer support service expenses	$	1,659,850
Legal		
Attorney General	$	14,358
Total legal expenses	$	14,358
Management Consulting		
Rajan Law	$	4,024
Total management consulting expenses	$	4,024
Medical		
Examworks Inc.	$	1,762
Total medical expenses	$	1,762
Total Consultant Expenditures	$	24,111,299

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Teachers Retirement Association of Minnesota
A Pension Trust Fund of the State of Minnesota

Investments

State Board of Investment Letter

MINNESOTA STATE BOARD OF INVESTMENT

60 Empire Drive
Suite 355
St. Paul, MN 55103
(651) 296-3328
FAX (651) 296-9572
E-mail:
minn.sbi@state.mn.us
www.sbi.state.mn.us

INVESTMENT AUTHORITY

The assets of the Minnesota Teachers Retirement Association (TRA) are invested along with the assets of the Minnesota Public Employees Retirement Association and the Minnesota State Retirement System under the direction and authority of the State Board of Investment (SBI) in accordance with Minnesota Statutes, Chapters 11A and 356A. The SBI includes Minnesota's governor, auditor, secretary of state and attorney general. The Legislature has established a 17-member Investment Advisory Council (IAC) to advise the SBI and its staff on investment related matters. TRA's executive director is a member of the IAC.

INVESTMENT POLICY

Investment policy states that the SBI will operate within standard investment practices of the prudent person. The SBI is to "exercise that degree of judgment and care, under circumstances then prevailing, which persons of prudence, discretion, and intelligence exercise in the management of their own affairs, not for speculation, but for investment, considering the probable safety of their capital as well as the probable income to be derived therefrom." (See M.S., section 11A.09.) The SBI is authorized to own government obligations, corporate obligations, various short-term obligations, corporate stocks, venture capital interests, resource investments, and real estate interests subject to specific constraints. (See M.S., section 11A.24.) In particular, pension fund assets are to be invested for the exclusive benefit of the members of the fund.

INVESTMENT OBJECTIVES AND PERFORMANCE

TRA's pension contributions from employees and employers are invested in the Combined Funds. The Combined Funds include the assets of active and retired public employees who participate in the defined benefit plans administered by TRA, the Minnesota State Retirement System, and the Public Employees Retirement Association. TRA does not own any underlying assets, but instead owns a participation in the pooled Combined Funds. Because these assets normally accumulate for thirty to forty years, SBI's objective is to take advantage of the long investment time horizon offered by equities and alternative assets in order to meet its actuarial return target and ensure that sufficient funds are available to finance promised benefits at the time of retirement. After a five year period where the 2012 Legislature lowered the actuarial return assumption from 8.5% to 8.0%, the actuarial return assumption returned to 8.5% as of July 1, 2017.

The long term objectives of the Combined Funds are:

- Provide returns that are 3-5 percentage points greater than inflation over the latest 20-year period; and

- Outperform a composite market index weighted in a manner that reflects the actual asset mix of the Combined Funds over the latest 10-year period.

Consistent with these objectives, the SBI maintains a long-term asset allocation for the Combined Funds as follows:

- Public Equity 58%
- Domestic Bonds 20%
- Private Markets 20%
- Cash 2%

Based on values on June 30, 2017, the Combined Funds returned 5.1 percentage points above the CPI over the last 20 years and returned 0.2 percentage point above the composite index over the past 10 years. Investment returns ranked in the 10th percentile over the past five years and in the 19th percentile over the past 10 years, compared to similar funds in the Trust Universe Comparison Service.

INVESTMENT PRESENTATION

Investment returns were prepared using time-weighted rate of return methodology based upon fair market value, net of investment expenses.

Respectfully submitted,

Mansco Perry III

Mansco Perry III
Executive Director
Minnesota State Board of Investment
November 17, 2017

Investment Summary

Prepared by TRA management with data obtained from the State Board of Investment's Fiscal Year 2017 Quarterly Investment Reports

The assets of the Minnesota Teachers Retirement Association (TRA) are invested under the direction and authority of the State Board of Investment (SBI). The investment portfolio of TRA had a fair value of approximately $21.2 billion as of June 30, 2017.

The four-member SBI Board consists of Governor Mark Dayton (Chair), Attorney General Lori Swanson, Secretary of State Steve Simon, and State Auditor Rebecca Otto.

The Legislature has established a 17-member Investment Advisory Council (IAC) to advise the SBI and its staff on investment-related matters.

- The mission statement of the Investment Advisory Council is: The IAC fulfills its statutory duty to the SBI by providing advice and independent due diligence review of the investment policy and implementation recommendations that guide the SBI's investment of assets.
- SBI appoints ten members experienced in finance and investment. These members traditionally have come from the Minneapolis and Saint Paul pension, foundation, and endowment investment community.
- The Commissioner of Minnesota Management and Budget (MMB) and the executive directors of TRA, the Minnesota State Retirement System and the Public Employees Retirement Association are permanent members of the Council.
- Two active employee representatives and one retiree representative are appointed to the Council by the Governor.
- All proposed investment policies are reviewed by the full Council before they are presented to SBI for action.

Investment Advisory Council

As of December 2017

Gary Martin, Chair
Chief Investment Officer
Macalester College

Kim Faust, Vice Chair
Vice President and Treasurer
Fairview Health Services

Denise Anderson
Governor's Appointee
Active Employee Rep.

Doug Anderson
Executive Director
Public Employees Retirement Association

Kerry Brick
Manager, Pension Investments
Cargill, Inc.

Dennis Duerst
Director, Benefit Funds Investment
3M Company

Myron Frans
Commissioner
Minnesota Management & Budget

Susanna Gibbons
Director
Carlson School Fixed Income Fund

Morris Goodwin, Jr.
Senior Vice President and CFO
American Public Media Group

Wei Huang
Chief Investment Officer
Saint Paul and Minnesota Community Foundation

Peggy Ingison
Governor's Appointee
Active Employee Representative

Erin Leonard
Executive Director
MN State Retirement System

Malcolm W. McDonald
Director and Corporate Secretary (Retired)
Space Center, Inc.

Carol Peterfeso
Chief Treasury and Investment Officer
University of St. Thomas

Jay Stoffel
Executive Director
Teachers Retirement Association

Shawn Wischmeier
Chief Investment Officer
Margaret A. Cargill Philanthropies

Vacant (1)

Aon Hewitt Investment Consulting, Inc., of Chicago is general consultants to the SBI. Pension Consulting Alliance of Studio City, California, serves as a special project consultant. Investment performance methodology is reported in compliance with the mandatory requirements of the Chartered Financial Analyst (CFA) Institute. All investments made by SBI are governed by the prudent person rule and other standards codified in Minnesota Statutes, Chapters 11A and 356A.

Combined Retirement Funds

Investment Objectives

All TRA assets are accounted for within the Combined Funds managed by the Minnesota State Board of Investment (SBI). The Combined Funds consist not only of the TRA Fund, but also the assets of the Public Employees Retirement Association (PERA) and the Minnesota State Retirement System (MSRS). The SBI has one primary responsibility with respect to its management of the Combined Funds: to ensure that sufficient funds are available to finance pension benefits at the time of retirement. All assets in the Combined Funds, including TRA, are managed externally by outside money management firms retained by contract.

The Combined Funds include the pension contributions of most Minnesota public employees, including TRA members, during their working years. Employee and employer contribution rates are specified in state law as a percentage of an employee's salary. The rates are set so that contributions plus expected investment earnings cover the projected cost of promised pension benefits. The actuarial assured TRA rate of return was 8.0 percent for fiscal years 2013 through 2017. Beginning July 1, 2017, the investment return assumption for TRA returns to 8.5 percent annually, under Minnesota statute.

While an active member is working, employee and employer contributions are placed into the TRA Fund. The pre-funding of future pension benefits provides the SBI with a long investment time horizon to take advantage of long run return opportunities offered by equities and other investments, in order to meet its actuarial return target.

SBI measures the performance of the Combined Funds relative to a composite of market indices that is weighted in a manner that reflects their long-term asset allocation policy. The Combined Funds are expected to match or exceed the composite index over a ten-year period. The Combined Funds are also expected to generate returns 3 to 5 percentage points greater than inflation over the latest 20-year period. Investment returns are prepared using a time-weighted rate of return methodology, based upon fair value, net of investment expenses. Performance is measured net of all fees and costs to ensure that SBI's focus is on the Combined Funds' true net return.

Asset Allocation

The allocation of assets among equities, fixed income (bonds) and alternative investments can have a dramatic impact on investment results. In fact, asset allocation decisions overwhelm the impact of individual security selection within a total portfolio. Consequently, SBI focuses considerable attention on the selection of an appropriate long-term asset allocation policy for the Combined Funds.

Changes Made During Fiscal Year 2017

At their June 2, 2016 board meeting, the board passed a motion to authorize a number of changes related to strategic asset allocations for fiscal year 2017. The changes listed were the result of the 2016 Combined Fund Assets Liability Study conducted by the SBI investment consultant. Below is a description of the changes in asset allocation:

	Allocation through Fiscal Year 2016	Allocation for Fiscal Year 2017
Public equity	60%	58%
Domestic equity	*45%*	*39%*
International equity	*15%*	*19%*
Domestic bonds	18%	20%
Private markets	20%	20%
Cash	2%	2%
Total	**100%**	**100%**

The SBI developed and approved new benchmarks for the various asset classes. They are described in more detail in the Notes to the Financial Statements (page 22).

Total Return Vehicles

SBI invested the majority of the Combined Funds' assets in common stocks (both domestic and international equities) and other equity investments. A large allocation is consistent with the long investment time horizon of the Combined Funds and the advantageous long-term risk-return characteristics of common stocks. Including international equities in the asset mix allowed SBI to diversify its holdings across world markets, offered the opportunity to enhance returns and reduced the risk/volatility of the total portfolio. The rationale underlying the inclusion of private equity alternative assets (e.g., venture capital) is similar.

SBI recognized that this sizable policy allocation to common stock and private equity likely produced more volatile portfolio returns than a more conservative policy focused on fixed income securities. It is understood that this policy may result in quarters or even years of disappointing results. Nevertheless, the long run return benefits of this policy are expected to compensate for the additional volatility.

Diversification Vehicles

Other asset classes are included in the Combined Funds both to provide some insulation against highly inflationary or deflationary environments and to diversify the portfolio sufficiently to avoid excessive return volatility.

Real estate and real assets (oil and gas) investments provide an inflation hedge that other financial assets do not offer. Under more normal financial conditions, such as low to moderate inflation, the returns on these assets were not highly correlated with common stocks. As a result, their inclusion in the Combined Funds served to dampen return volatility.

Private credit investments provide the opportunity for higher long-term returns than those typically available from bonds yet still generate sufficient current income. Typically, these investments, including subordinated debt, mezzanine or resource income investments such as income-producing properties, are structured more like fixed income securities with the opportunity to participate in the appreciation of the underlying assets. While these investments may have an equity component, they display a return pattern more like a bond. As such, they help reduce the volatility of the total portfolio, while generating higher returns relative to more traditional bond investments.

The allocation to fixed income (bonds) acts as a hedge against a deflationary economic environment. In the event of a major deflation, high-quality fixed income assets, particularly long-term bonds, are expected to protect principal and generate significant capital gains. And, like real estate and real assets, under normal financial conditions, bonds help diversify the Combined Funds and thereby control return volatility.

Rate of Return Results

The Combined Funds produced a total rate of return for fiscal year 2017 of 15.1 percent. Over the last five years, the Combined Funds generated an annualized return of 10.2 percent.

As stated earlier, the Combined Funds are expected to exceed the return of a composite of market indices over a ten-year period. Performance relative to this standard measured two effects:

- The ability of the investment managers selected by SBI, in aggregate, to add value to the returns available from the broad capital markets.
- The impact of SBI's rebalancing activity. (SBI rebalances the total fund when market movements take the stock or bond segments measurably above or below their long-term asset allocation targets. The policy imposes a low risk, buy low sell high discipline among asset classes on a total fund basis.)

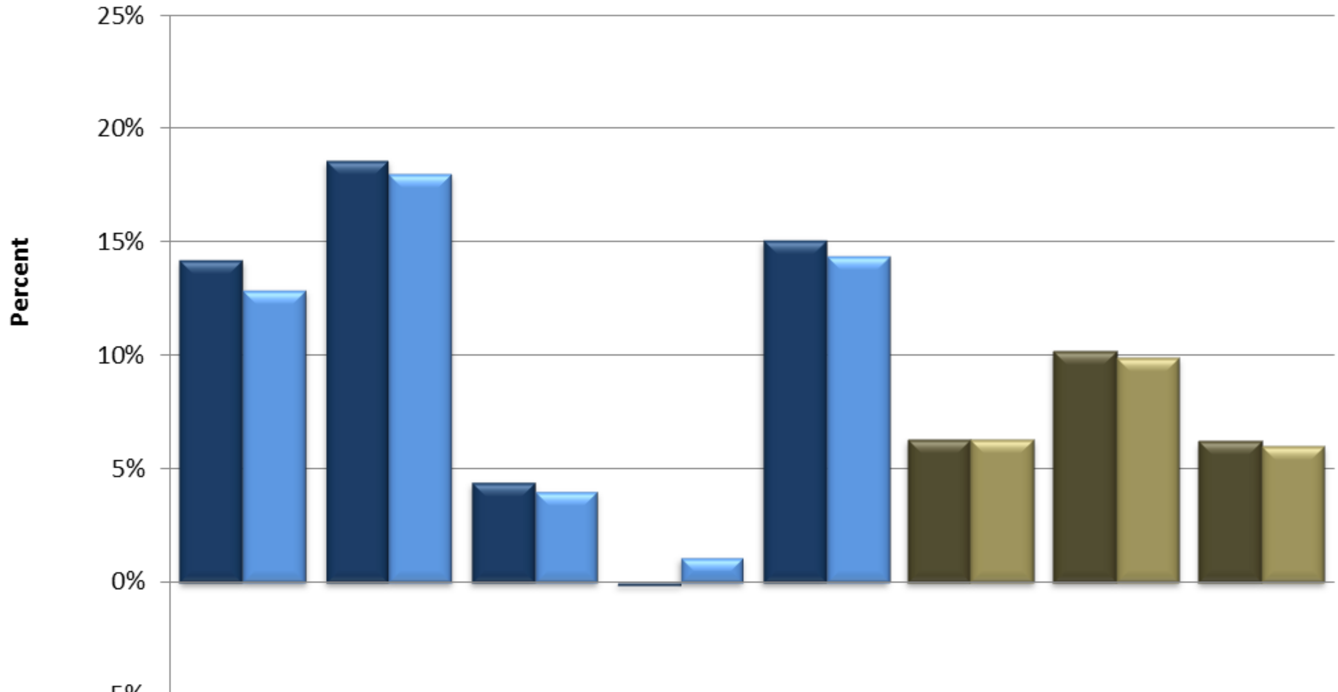
Combined Funds Performance vs. Composite Index

For the ten-year period ending June 30, 2017, the Combined Funds exceeded the composite index investment performance by 0.2 percent annualized. The Funds exceeded the composite index over the last five years by 0.3 percent annualized, and outperformed the index over the most recent fiscal year by 0.7 percentage points. Actual returns relative to the total fund composite index over the last five years are shown in the graph on the following page.

Combined Funds

Investment Performance

Combined Funds Performance vs. Composite Index FY 2013 – 2017



	2013	2014	2015	2016	2017	3 Yr.	5 Yr.	10 Yr.
Combined Funds	14.2%	18.6%	4.4%	-0.1%	15.1%	6.3%	10.2%	6.2%
Composite Index	12.9%	18.0%	4.0%	1.1%	14.4%	6.3%	9.9%	6.0%

All investment performance methodology is reported in compliance with the mandatory requirements of the Chartered Financial Analyst (CFA) Institute. Investment returns are prepared using a time-weighted rate of return methodology, based on fair value, net of investment expense.

Combined Funds
Performance of Asset Pools (Net of Fees)

June 30, 2017

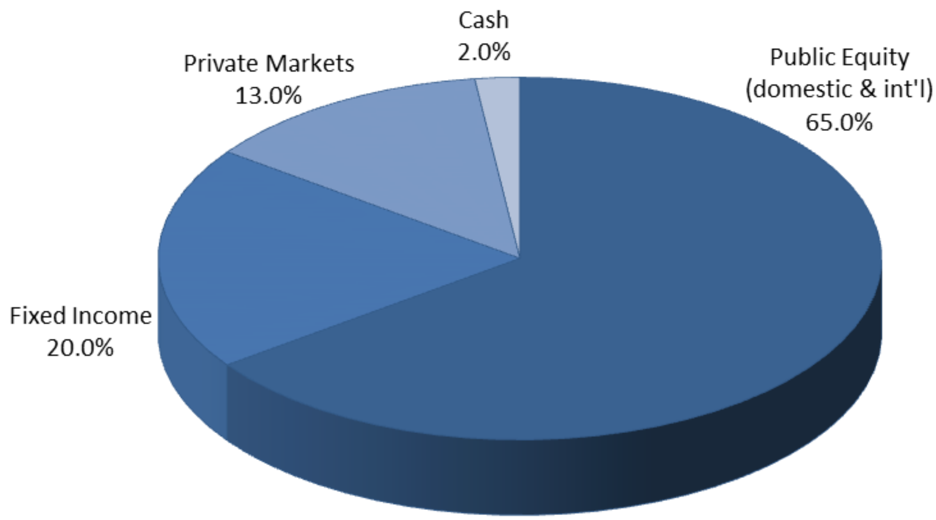
Rates of Return (Annualized)

	1 Year %	3 Year %	5 Year %	10 Year %	20 Year %
Public equity	19.9	7.0	13.0	5.9	6.7
Public equity benchmark	19.2				
Excess	0.6				
Domestic equity	19.4	8.7	14.5	7.1	7.1
Domestic equity benchmark	18.5	9.1	14.6	7.3	7.2
Excess	0.9	-0.4	-0.0	-0.1	-0.1
International equity	20.2	1.5	8.0	1.6	4.9
International equity benchmark	20.5	0.8	7.2	1.2	4.5
Excess	-0.2	0.7	0.8	0.4	0.4
Fixed Income (Bond) Pool	0.9	2.9	2.9	4.9	5.6
Asset Class Target (Barclays Capital Aggregate Bond Index)	-0.3	2.5	2.2	4.5	5.2
Excess	1.2	0.4	0.7	0.4	0.4
Total private markets	19.7	8.9	11.3	9.0	13.3
Private equity	18.7	12.6	14.1	10.9	14.0
Private credit	20.0	14.4	14.6	11.1	13.2
Resources	27.3	-4.7	1.7	6.9	15.1
Real estate	7.8	11.8	12.3	4.7	10.0

All investment performance methodology is reported in compliance with the mandatory requirements of the Chartered Financial Analyst (CFA) Institute. Investment returns are prepared using a time-weighted rate of return methodology, based on fair value, net of investment expense.

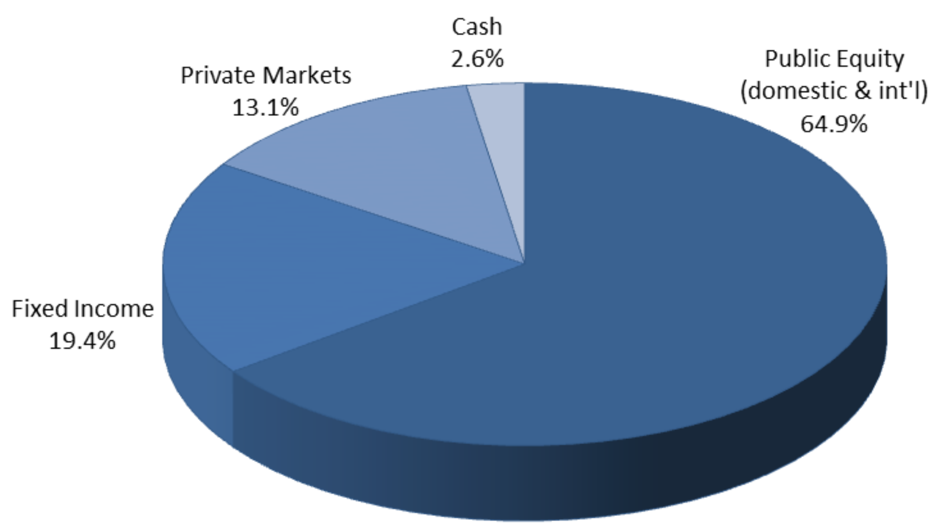
Combined Funds
Portfolio Distribution: Policy Asset Mix

As of June 30, 2017



Combined Funds
Portfolio Distribution: Actual Asset Mix

As of June 30, 2017



The fair value of the TRA Fund assets is approximately $21.2 billion.

Teachers Retirement Fund
List of Largest Assets Held

June 30, 2017

Composite Holdings of Top Ten Equities

By Fair Value

Security	$ Fair Value (Millions)	% of Portfolio
Apple Inc	$ 244.3	1.15
Microsoft Corp	$ 169.8	0.80
Amazon.com, Inc	$ 145.0	0.68
Facebook, Inc A	$ 133.3	0.63
Johnson + Johnson	$ 120.6	0.57
JPMorgan Chase + Co	$ 110.6	0.52
Exxon Mobil Corp	$ 109.4	0.52
Alphabet, Inc Cl A	$ 104.4	0.49
Berkshire Hathaway, Inc Cl B	$ 102.2	0.48
Alphabet, Inc Cl C	$ 92.9	0.44

Composite Holdings of Top Ten Bond Holdings

By Fair Value

Security	% Coupon	$ Fair Value (Millions)	% of Portfolio
FNMA TBA 30 YR 3.5	3.50	$ 88.6	0.40
FNMA TBA 30 YR 3	3.00	$ 55.5	0.26
US TREASURY N/B	3.75	$ 53.3	0.25
US TREASURY N/B	2.00	$ 48.9	0.23
US TREASURY N/B	2.25	$ 36.2	0.17
US TREASURY N/B	1.25	$ 35.4	0.17
US TREASURY N/B	1.375	$ 35.3	0.17
US TREASURY N/B	1.375	$ 32.6	0.15
US TREASURY N/B	1.875	$ 25.7	0.12
FNMA TBA 30 YR 3	2.125	$ 25.7	0.12

TRA's assets are commingled in various pooled investment accounts administered by the State Board of Investment (SBI). TRA does not own specific values of the underlying assets. The percentages and fair value shown are those attributable to the TRA Fund based on TRA's participation in the SBI's Combined Funds. Information on investment activity, a listing of specific investments owned by the pooled accounts and a schedule of fees and commissions can be obtained from SBI.

Teachers Retirement Fund
Schedule of Investment Management Fees

For the Fiscal Year Ended June 30, 2017

Domestic Activity Equity Pool Managers		
Barrow, Hanley	$	310,983
Earnest Partners		213,818
Intech Investment		136,636
Goldman Equity		687,910
Hotchkis and Wiley		743,733
Jacobs Levy Equity		68,966
LSV Asset		576,797
Martingale		549,916
Mckinley Cap		499,913
Next Century Growth		(66,277)
Peregrine Capital		681,047
Sands Capital		279,739
Systematic Fin		20,402
Winslow Capital		237,663
Zevenbergen Capital		509,208
Arrowpoint Asset Mgmt LLC		265,460
Hood River Capital Mgmt LLC		331,041
Rice Hall James & Assoc., LLC		281,643
Wellington Mgmt Co, LLP		291,042
Total Domestic Activity Equity Pool Managers	$	6,619,640
Passive Domestic Equity Pool Managers		
Blackrock	$	314,593
Total Passive Domestic Equity Pool Managers	$	314,593
Semi Passive Equity Pool Managers		
Blackrock	$	492,080
Mellon Capital		501,083
JP Morgan		677,080
Intech		421,881
Total Semi Passive Equity Pool Managers	$	2,092,124
Domestic Bonds Pool Managers		
Columbia Invest	$	367,533
Blackrock Financial Mgmt		362,625
Aberdeen Asset Management	$	207,610
Dodge & Cox		556,699
Goldman		553,039
Neuberger		233,656
PIMCO		1,063,575
Western Asset Management		481,202
Total Domestic Bonds Pool Managers	$	3,825,939
Page Subtotal	$	12,852,296

Teachers Retirement Fund
Schedule of Investment Management Fees (cont.)

For the Fiscal Year Ended June 30, 2017

Subtotal from Previous Page	$	12,852,296
Global Equity Pool Managers		
Acadian Asset	$	539,558
State Street Emerging		132,024
AQR Capital Mgmt		541,215
Capital Intern		452,355
Fidelity Investments		558,887
Fidelity Investments		329,587
JP Morgan Fleming		394,873
Earnest Partners, LLC		169,779
Macquarie/Delaware Investments		150,042
Martin Currie, Inc		148,183
Marathon Asset		835,354
Mckinley Capital Management		410,215
Morgan Stanley Dean		1,641,391
Neuberger Berman Investment		204,962
Pzena Investment Management		201,953
Rock Creek		242,729
Columbia Investments		383,430
State Street Alpha		207,023
State Street		198,889
Total Global Equity Pool Managers	$	7,742,449
Total Investment Management Fees	$	20,594,745

Note: *The investment portfolio of TRA had a fair value of approximately $21.2 billion as of June 30, 2017.*

Teachers Retirement Fund
Summary of Investments

As of June 30, 2017

	Cost Value	Fair Value	% of Investments at Fair Value
Fixed Income Investments			
Bond Pool	$ 3,939,884,291	$ 4,098,976,802	19.32%
Equity Investments			
US Stock Index Fund	$ 2,430,795,672	$ 3,502,669,722	16.51%
Broad International Stock Fund	3,889,634,876	4,583,376,907	21.60%
Small Cap Active	652,144,653	754,672,007	3.56%
Large Cap Active	1,169,877,043	1,340,952,918	6.32%
Large Passive	3,237,606,429	3,544,020,136	16.70%
Total Equity Investments	$ 11,380,058,673	$ 13,725,691,690	64.68%
Alternative Investments			
Alternative Investment Pool	$ 2,740,046,415	$ 2,773,952,135	13.07%
Short Term Investments			
CD Repo Pool	$ 98,702,783	$ 98,825,212	0.47%
Short Term Cash Equivalents	523,576,234	523,947,470	2.47%
Total Short Term Investments	$ 622,279,017	$ 622,772,682	2.93%
Total Investments	$ 18,682,268,396	$ 21,221,393,309	100.0%

General Information Regarding Investment of Funds

TRA's investments are made by SBI and external managers as prescribed by law, and are made only in such securities as are duly authorized legal investments in accordance with Minnesota Statutes, section 11A.24. State Street Bank and Trust of Boston acts as custodian of securities for the Combined Funds. Examination and verification of securities held by the custodians is performed periodically by the Minnesota Office of the Legislative Auditor. Investment returns are prepared using a time-weighted rate of return methodology, based upon fair values, net of investment expenses.

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Teachers Retirement Association of Minnesota
A Pension Trust Fund of the State of Minnesota

Actuarial

Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

December 6, 2017

Board of Trustees
Teachers Retirement Association of Minnesota
60 Empire Drive, Suite 400
St. Paul, MN 55103

Dear Board Members:

At your request, we have prepared an actuarial funding valuation of the Teachers Retirement Association of Minnesota (TRA or System) as of July 1, 2017 for the plan year ending June 30, 2018. Such valuations, which analyze the funding progress of the System, are required to be performed annually under state law. To the best of our knowledge and belief, the funding valuation was performed in accordance with the requirements of Minnesota Statutes, Section 356.215, and the requirements of the Standards for Actuarial Work established by the State of Minnesota Legislative Commission on Pensions and Retirement (LCPR). The valuation results reflect the benefit provisions in place on July 1, 2017.

There were no changes to plan provision or actuarial methods; however, there was one change to the actuarial assumptions: an adjustment to the combined service annuity loads. This assumption is based on analysis performed by the actuary retained by Legislative Commission on Pensions and Retirement (LCPR) and their recommendation. Cavanaugh Macdonald Consulting, LLC has not performed its own analysis, but has relied on accuracy of the work performed by the actuary retained by the LCPR. The impact of these changes in assumptions resulted in a decrease in the actuarial accrued liability of $104 million and a decrease in the total required contribution rate of 0.28%.

The actuarial audit of the July 1, 2016 actuarial valuation, performed by Deloitte Consulting LLP, identified two minor changes as potential improvements to the valuation process. Those adjustments were made in the July 1, 2017 valuation and resulted in a small increase in the actuarial accrued liability. In addition, this is the first valuation prepared using the actuarial census file created after significant upgrades to TRA's IT System. There were several improvements in the actuarial file, but one is worth noting. In the past, Cavanaugh Macdonald determined the vested status of members who have terminated employment based on available information. The new actuarial census file includes a data field for the member's vested status, as determined by the System. As a result, some members who were previously assumed to be vested are now identified as non-vested, thereby lowering the actuarial accrued liability. The small increase in the actuarial accrued liability due to the adjustments recommended in the audit report was offset by a decrease in the actuarial accrued liability resulting from the improved quality of the member census data.

3802 Raynor Pkwy, Suite 202, Bellevue, NE 68123
Phone (402) 905-4461 • Fax (402) 905-4464
www.CavMacConsulting.com
Offices in Kennesaw, GA • Bellevue, NE

The investment return assumption to be used for the actuarial funding valuation is set in Minnesota Statute Section 356.215, and currently is 8.5%. Earlier this year, the TRA Board commissioned Cavanaugh Macdonald to perform a review of the economic assumptions to be used in the actuarial funding valuation. The findings and recommendations of that analysis, which were provided to the Board at their November 2017 meeting, included a change in the investment return assumption to 7.5%. In our professional judgment, the 8.5% statutory investment return assumption is not reasonable for the purposes of the funding valuation, i.e., determining the funded status of the plan and future contribution requirements to adequately fund the plan. Nonetheless, this official valuation results must be prepared in accordance with the applicable state law, including the statutory investment return assumption of 8.5%. As a result, the investment return assumption used in the July 1, 2017 valuation is unchanged from the prior valuation.

Under current statutes, the post-retirement cost of living adjustment (COLA) of 2.0% increases to 2.5% if the funded ratio of the System is at least 90% for two consecutive years. Based on the current benefit structure and contribution rates, and the statutory investment return assumption, TRA is expected to meet the criteria in 2045 so the COLA is assumed to increase from 2.0% to 2.5% at that time. In the July 1, 2016 funding valuation, the COLA was assumed to never increase from 2.0% to 2.50%.

As described in the funding valuation report, the results of the valuation indicate that the System is 76.79% funded and the current statutory contribution rates are deficient by 2.50% of payroll to meet the target of full funding by 2039. The deficiency is determined using the actuarial value of assets which is lower than the market value of assets. If the net deferred investment gain is recognized, i.e., the fair value of assets is used, the contribution deficiency decreases to 2.22% of payroll. The funding report was prepared exclusively for TRA and the LCPR to determine the annual required contribution rate using the statutory investment return assumption of 8.50%.

In preparing the valuation, we relied, without audit, on information (some oral and some in writing) supplied by TRA staff. This information includes, but is not limited to, statutory provisions, member data and financial information. We found this information to be reasonable and comparable to information used in last year's valuation. However, we did not audit the data. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations may need to be revised.

The actuarial contribution rates are developed using the Entry Age Normal (EAN) cost method. An asset smoothing method, defined in statute, is used for actuarial valuation purposes. Gains and losses are reflected in the unfunded actuarial accrued liability and are amortized as a level percentage of payroll over a closed period set in state statute. Actuarial assumptions, including discount rates, mortality tables and others identified in the valuation report are prescribed by Minnesota Statutes Section 356.215, the Legislative Commission on Pensions and Retirement (LCPR), and the Board of Trustees. Collectively, these parties are responsible for selecting the plan's funding policy, actuarial valuation methods, asset valuation method, and actuarial assumptions. The policies, methods and assumptions used in this valuation are those that have been so prescribed and are described in Appendix C of the valuation report.

For purposes of the statutorily required actuarial valuation report for funding, the investment return assumption is set in statute. Currently, the assumption is 8.00% for the five year period from July 1, 2012 to June 30, 2017 and 8.50% thereafter. Although the TRA Board recommended a decrease to the long-term investment return assumption, the relevant sections of state law were not changed during the 2016 or 2017 legislative session. Therefore, the formal results in this year's valuation report were prepared using an investment return assumption of 8.50%, as prescribed in statute. As noted earlier, the TRA Board commissioned Cavanaugh Macdonald to perform a review of the economic assumptions used in the actuarial valuation. The findings and recommendations were provided to the Board at their November 2017 meeting. The report's findings represent our best estimate for the economic assumptions to be used in TRA's funding valuation, as set out below:

- Lower the investment return assumption from 8.50% to 7.50%.
- Lower price inflation from 2.75% to 2.50%.
- Lower payroll growth assumption from 3.50% to 3.00%.
- Lower the wage inflation component of the salary increase assumption from 3.50% to 2.85% for 10 years and 3.25%, thereafter.

The following table provides a summary of the key valuation measurements, on both an actuarial and market value basis, using the recommended set of economic assumptions. In addition, Minnesota Statutes, Section 356.215, Subdivision 11 addresses the recalculation of the established date for full funding when there is a change in the actuarial assumptions, benefit structure, or actuarial cost method that produces a net increase in the unfunded actuarial accrued liability (UAAL). If the recommended set of economic assumptions are adopted, it would result in a net increase in the UAAL so this section of statute would be applicable. Based on the required calculation in Minnesota Statutes, Section 356.215, Subdivision 11, the amortization period would be extended two years, from FY 2039 to FY 2041.

	Valuation	Recommended Assumptions	
	Results	Actuarial Value	Market Value
Value of Assets	$ 21.06B	$ 21.06B	$ 21.25B
Unfunded Actuarial Accrued Liability (UAAL)	$ 6.36B	$ 9.27B	$ 9.08B
Actuarial Accrued Liability Funding Ratio	76.8%	69.4%	70.1%
Normal Cost Rate (% of pay)	8.77%	10.54%	10.54%
Amortization of UAAL (% of pay)	9.41%	12.54% *	12.28% *
Expenses (% of pay)	0.25%	0.25%	0.25%
Total Required Contribution (% of pay)	18.43%	23.33%	23.07%
Member and Employer Contributions	15.22%	15.22%	15.22%
State Aid	0.71%	0.71%	0.71%
Contribution Deficiency (% of pay)	(2.50%)	(7.40%)	(7.14%)

* Reflects extension of amortization period to 24 years following Minnesota Statute Section 356.215, Subdivision 11.

Future actuarial results may differ significantly from the current results presented in this report due to factors such 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 (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Since the potential impact of such factors is outside the scope of a normal actuarial valuation, an analysis of the range of potential results is not presented herein.

The actuary prepared the following supporting schedules in the Actuarial Section of the Comprehensive Annual Financial Report:

- Reconciliation of Member Data
- Actuarial Asset Value
- Actuarial Valuation Balance Sheet
- Determination of Unfunded Actuarial Accrued Liability and Supplemental Contribution Rate
- Changes in the Unfunded Actuarial Accrued Liability
- Determination of Contribution Sufficiency /(Deficiency) – Total
- Solvency Test
- Schedule of Funding Progress
- Schedule of Active Member Valuation Data

We also provided the following schedules in the Financial Section of the Comprehensive Annual Financial Report:

- Total Pension Liability
- Schedule of Changes in the Employers' Net Pension Liability
- Schedule of the Employers' Net Pension Liability
- Sensitivity Analysis on the Net Pension Liability

In addition, we provided the *Schedule of Contributions from Employers and Non-employer Contributing Entities* found in the Required Supplementary Information. The schedules are presented prospectively and in time, trend analysis will become evident. Actuarial computations presented in the July 1, 2017 actuarial valuation report are for purposes of determining the recommended funding amounts for the System. The calculations have been made on a basis consistent with our understanding of the System's funding requirements and goals, and on a basis consistent with our understanding of the plan provisions described in Appendix B of the valuation report. Determinations for purposes other than meeting these requirements may be significantly different from the results shown in the July 1, 2017 actuarial valuation report. Accordingly, additional determinations may be needed for other purposes.

We also prepared actuarial computations as of June 30, 2017 for purposes of fulfilling financial accounting requirements for the System under Governmental Accounting Standards Board (GASB) Statement No. 67, the results are presented in a separate report dated December 1, 2017. The actuarial assumptions used in the funding valuation report were also used for GASB 67 reporting, except for the use of a 7.5% discount rate for the GASB 67 calculation of the Total Pension Liability. In addition, the entry age normal actuarial cost method, which is required to be used under GASB 67, is also used in the statutory funding valuation report. The actuarial assumptions and methods used in both the funding and the GASB 67 accounting valuation reports meet the parameters set by Actuarial Standard of Practice (ASOPs), as issued by the

Actuarial Standards Board, and generally accepted accounting principles (GAAP) applicable in the United State of America as promulgated by the Governmental Accounting Standards Board.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this information is complete and accurate and that the valuation was prepared in accordance with principles of practice which are consistent with the Actuarial Standards of Practice promulgated by the Actuarial Standards Board and the applicable Guides to Professional Conduct, amplifying Opinions, and supporting recommendation of the American Academy of Actuaries. In addition, the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the retirement System. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. Also, we meet the requirements of "approved actuary" under Minnesota Statutes, Section 356.215, Subdivision 1, Paragraph (c).

Respectfully submitted,

Patrice Beckham

Patrice A. Beckham, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

Brent A. Banister

Brent Banister PhD, FSA, EA, FCA, MAAA
Chief Actuary

Summary of Actuarial Assumptions and Methods

Summary of Actuarial Assumptions

The following assumptions were used in valuing the liabilities and benefits under the plan. A description of plan provisions is provided beginning on page 121.

The Allowance for Combined Service Annuity was based on the recommendation of a prior actuary. We are unable to judge the reasonableness of this assumption without performing a substantial amount of additional work beyond the scope of this assignment.

All assumptions are prescribed by Statute, the Legislative Commission on Pensions and Retirement (LCPR), or the Board of Trustees. The date of TRA's last experience study was June 5, 2015. The LCPR last enacted changes to TRA's demographic actuarial assumptions on February 3, 2016.

Investment return	8.50 percent compounded annually.
Future post-retirement adjustments	2 percent per year. Once the funded ratio reaches 90 percent on a market value basis for two consecutive years, the COLA is scheduled by statute to revert back from 2.00 percent to 2.50 percent. Future assets and liabilities were projected using the 2017 valuation results as a starting point and assuming all actuarial assumptions are met in future years. These assumptions include a rate of return on the market value of assets of 8.5 percent. Further, there is an assumption that the stabilizer provisions will not be utilized by the Board. Based on this methodology, as of July 1, 2017, the COLA is expected to increase with the July 1, 2045 valuation. For the July 1, 2016, valuation, the increased COLA was not expected to be implemented during the next 40 years, and so it was assumed it would not occur.
Salary increases	Reported salary for prior fiscal year, with new hires annualized, is increased according to the salary increase table shown in the rate table for current fiscal year and annually for each future year. See table of sample rates.
Payroll growth	3.50 percent per year
Future service	Members are assumed to earn future service at a full-time rate.
Mortality: Pre-retirement	RP 2014 white collar employee table, male rates set back 6 years and female rates set back 5 years. Generational projection uses the MP-2015 scale.
Post-retirement	RP 2014 white collar annuitant table, male rates set back 3 years and female rates set back 3 years, with further adjustments of the rates. Generational projection uses the MP-2015 scale.
Post-disability	RP 2014 disabled retiree mortality, without adjustment.
Disability	Age-related rates based on experience; see table of sample rates (page 80).
Withdrawal	Rates vary by service based on actual plan experience, as shown in the rate table.
Expenses	Prior year administrative expenses expressed as percentage of prior year payroll.
Retirement age	Graded rates beginning at age 55 as shown in rate table. Members who have attained the highest assumed retirement age will retire in one year.
Percentage married	85 percent of male members and 65 percent of female members are assumed to be married. Members are assumed to have no children.
Age difference – married	Females two years younger than males.

Allowance for Combined Service Annuity	Liabilities for vested former members are increased by 7.00 percent and liabilities for non-vested former members are increased by 9.00 percent to account for the effect of some participants being eligible for a Combined Service Annuity.
Refund of contributions	All employees withdrawing after becoming eligible for a deferred benefit are assumed to take the larger of their contributions accumulated with interest or the value of their deferred benefit.
Interest on member contributions	Members and former members who are eligible for the money purchase annuity are assumed to receive interest credits equal to the Pre-Retirement interest rate. All other members and former members receive the interest crediting rate as specified in statutes.
Commencement of deferred benefits	Members receiving deferred annuities (including current terminated deferred members) are assumed to begin receiving benefits at unreduced retirement age.
Form of payment	Married members are assumed to elect subsidized joint and survivor (J&S) form of annuity as follows: Males: 10% elect 50% J&S option 10% elect 75% J&S option 60% elect 100% J&S option 20% elect Straight Life option Females: 13.5% elect 50% J&S option 6.5% elect 75% J&S option 35% elect 100% J&S option 45.0% elect Straight Life option Members eligible for deferred annuities (including current terminated deferred members) and future disability benefits are assumed to elect a life annuity.
Missing data for members	Membership data was supplied by TRA as of the valuation date. This information has not been audited by CMC. We have reviewed the information for internal consistency and we have no reason to doubt its substantial accuracy. In the small number of cases where submitted data was missing or incomplete and could not be recovered from prior years, the following assumptions were applied if needed: Data for active members: Salary, service, and date of birth: Based on current active demographics Gender: Female Data for terminated members: Date of birth: July 1, 1969 Average salary: $38,500 Date of termination: Derived from date of birth, original entry age, and service Data for in-pay members: Beneficiary date of birth: Wife two years younger than husband Gender: Based on first name Form of payment: Life annuity for retirees and beneficiaries, 100% J&S option for disabled retirees.
Changes in actuarial assumptions since the previous valuation	The Combined Service Annuity liability loads were updated for active, vested inactive members and non-vested inactive members.

Summary of Actuarial Assumptions *(continued)*

Pre-Retirement Mortality Rates (%)*

Age	Male	Female
20	0.023	0.013
25	0.026	0.014
30	0.036	0.014
35	0.031	0.018
40	0.035	0.024
45	0.041	0.033
50	0.061	0.055
55	0.105	0.092
60	0.175	0.140
65	0.292	0.204

**Rates shown are for 2014, the base year of the tables.*

Annuitant Mortality Rates (%)

	Retirement*		Disability	
Age	Male	Female	Male	Female
55	0.267	0.196	2.337	1.448
60	0.353	0.267	2.660	1.700
65	0.486	0.430	3.169	2.086
70	0.945	0.706	4.035	2.820
75	2.015	1.352	5.429	4.105
80	4.126	2.682	7.662	6.104
85	7.358	5.456	11.330	9.042
90	13.560	9.947	17.301	13.265
95	24.351	18.062	24.717	19.588
100	38.292	29.731	32.672	27.819

**Rates shown are for 2014, the base year of the tables.*

Termination Rates

Service	Male	Female
Less than 1	32.00%	29.00%
1	15.00%	13.00%
2	11.00%	11.00%
3	8.50%	9.00%
4	6.25%	7.00%
5	5.25%	5.50%
6	4.60%	4.00%
7	4.10%	3.50%
8	2.80%	3.00%
9	2.30%	2.50%
10	2.00%	2.10%
15	1.10%	1.10%
20	0.60%	0.60%
25 or more	0.50%	0.50%

Summary of Actuarial Assumptions *(continued)*

Disability Rates (%)

Age	Male	Female
20	0.00	0.00
25	0.00	0.00
30	0.00	0.00
35	0.01	0.01
40	0.03	0.03
45	0.05	0.05
50	0.10	0.10
55	0.16	0.16
60	0.25	0.25
65	0.00	0.00

Retirement Rates for Coordinated Members (%)

Coordinated Tier 2 members age 62 or older with 30 or more years of service have 5 percent added to their early retirement rates.

Age	Tier 1 Early	Tier 1 Unreduced	Tier 2 Early	Tier 2 Unreduced
55	5	35	5	
56	10	35	5	
57	10	35	5	
58	10	35	5	
59	14	35	5	
60	17	35	6	
61	20	35	15	
62	25	35	15	
63	25	35	15	
64	25	35	20	
65		40	30	
66		35		35
67		30		30
68		30		25
69		30		25
70		35		35
71 and over		100		100

Salary Scale

Service (Yrs)	Salary Increase
1	9.50%
2	7.75%
3	7.25%
5	7.00%
10	6.25%
15	5.00%
20	4.10%
26 or more	3.50%

Valuation Report Highlights

Summary of Key Valuation Results

	Actuarial Valuation as of	
	July 1, 2017	**July 1, 2016**
Participant Data		
Active members		
Number	81,811	80,530
Projected annual earnings for fiscal year *(000s)*	$ 5,043,499	$ 4,858,593
Average projected annual earnings for fiscal year 2017	$ 61,648	$ 60,333
Average age	43.2	43.3
Average service	11.9	11.9
Service retirements	58,989	57,891
Survivors	5,268	5,091
Disability retirements	517	521
Deferred retirements	14,030	13,680
Non-vested terminated members	33,344	31,850
Total	**193,959**	**189,563**
Liabilities and Funding Ratios (dollars in thousands)		
Accrued Benefit Funding Ratio		
Current assets (AVA)	$ 21,062,789	$ 20,194,279
Current benefit obligations	25,942,767	25,304,940
Funding ratio	81.19%	79.80%
Accrued Liability Funding Ratio		
Current assets (AVA)	$ 21,062,789	$ 20,194,279
Fair value of assets (MVA)	21,253,486	19,420,131
Actuarial accrued liability	27,427,702	26,716,216
Unfunded actuarial accrued liability	6,364,913	6,521,937
Funding ratio (AVA)	76.79%	75.59%
Funding ratio (MVA)	77.49%	72.69%
Projected Benefit Funding Ratio		
Current and expected future assets	$ 30,180,088	$ 29,080,864
Current and expected future benefit obligations	31,871,009	30,950,072
Funding ratio (AVA)	94.69%	93.96%
Contributions (% of payroll)		
Normal Cost Rate	8.77%	8.79%
UAAL Amortization Payment	9.41%	9.70%
Expenses	0.25%	0.23%
Total Required Contribution (Chapter 356)	18.43%	18.72%
Statutory Contribution (Chapter 354)	15.93%	15.94%
Contribution (Deficiency)/Sufficiency	(2.50%)	(2.78%)

Actuary's Selected Commentary

The Teachers Retirement Association of Minnesota (TRA) provides retirement, disability, and death benefits to Minnesota public school teachers, administrators, and college faculty. This report presents the results of the July 1, 2016, actuarial funding valuation. The primary purposes of performing the actuarial valuation are to:

- determine the required contribution rate as set forth in Chapter 356 of the Minnesota statutes;
- determine the sufficiency of the statutory contribution rate as set forth in Chapter 354 of the Minnesota statutes;
- determine the experience of the fund since the last valuation date;
- disclose asset and liability measures as of the valuation date; and
- analyze and report on trends in contributions, assets, and liabilities over the past several years.

There were no changes to plan provisions or actuarial methods since the last valuation; however, there was one change to the actuarial assumptions: an adjustment to the combined service annuity loads. The actuary to the Legislative Commission on Pensions and Retirement, Deloitte Consulting LLP, performed the analysis to determine the appropriate loads for various membership classifications. Based on their work, the liability loads were adjusted as follows:

- Actives: reduced from 1.4 percent to 0.0 percent.
- Vested inactive members: increased from 4.0 percent to 7.0 percent.
- Non-vested inactive members: increased from 4.0 percent to 9.0 percent.

The impact of these changes in assumptions resulted in a decrease in the actuarial accrued liability of $104 million and a decrease in the total required contribution rate of 0.28 percent.

The actuarial audit of the July 1, 2016, actuarial valuation, performed by Deloitte Consulting LLP, identified two minor changes as potential improvements to the valuation process. Those adjustments were made in the July 1, 2017, valuation and resulted in a small increase in the actuarial accrued liability. In addition, this is the first valuation prepared using the actuarial census file created after significant upgrades to TRA's IT system. There were several improvements in the actuarial file, but one is worth noting. In the past, Cavanaugh Macdonald determined the vested status of members who have terminated employment based on available information. The new actuarial census file includes a data field for the member's vested status, as determined by the system. As a result, some members who were previously assumed to be vested are now identified as non-vested, thereby lowering the actuarial accrued liability. The small increase in the actuarial accrued liability due to the adjustments recommended in the audit report was offset by a decrease in the actuarial accrued liability resulting from the improved quality of the member census data.

The actuarial valuation results provide a "snapshot" view of the TRA's financial condition on July 1, 2017. The results reflect net favorable experience for the past plan year as demonstrated by an UAAL that was lower than expected. The UAAL on July 1, 2017, is $6.365 billion as compared to an expected UAAL of $6.599 billion (reflecting the $104 million decrease due to the new assumptions). The net favorable experience of $234 million was the combination of an experience gain of $303 million on the actuarial value of assets and an experience loss of $69 million on liabilities. The majority of the liability loss was due to the change in the projected date the COLA is expected to increase from 2.0 percent to 2.5 percent, which occurs when the fund has been 90 percent funded for two consecutive years.

A summary of the key results from the July 1, 2017, actuarial valuation is shown later. Further detail on the valuation results can be found on the following pages.

The contribution deficiency decreased from 2.78 percent of payroll in last year's valuation to 2.50 percent of payroll in the 2017 valuation. The most significant component of this decrease was due to the gain on actuarial assets.

	Actuarial Valuation as of	
	July 1, 2017	July 1, 2016
Total Required Contribution Rate (Chapter 356)	18.43%	18.72%
Statutory Contribution Rate (Chapter 354)	15.93%	15.94%
Sufficiency/(Deficiency)	(2.50%)	(2.78%)
Unfunded Actuarial Accrued Liability ($M)	$6,365	$6,522
Funded Ratio (Actuarial Assets)	76.79%	75.59%

Experience studies are prepared for TRA periodically, with the most recent report based on the six-year period of July 1, 2008 through June 30, 2014. That experience study included a recommendation to lower the investment return assumption to 8.00 percent. However, the investment return assumption is set in statute and requires legislative action to make a change. Such action has not yet occurred. Earlier this year, the TRA Board commissioned Cavanaugh Macdonald to perform a review of the economic assumptions used in the actuarial valuation. The findings and recommendations were provided to the Board at their November 2017 meeting. The report's findings represent our best estimate for the economic assumptions to be used in TRA's funding valuation. Specific assumption changes include:

- Inflation: 2.5 percent
- Investment return: 7.50 percent
- Salary increase: 2.85 percent for 10 years and 3.25 percent thereafter plus merit scale
- Payroll growth: 3.00 percent

The investment return assumption to be used for the actuarial funding valuation is set in Minnesota Statute Section 356.215, and currently is 8.5 percent. In our professional judgment, the 8.5 percent statutory investment return assumption is not reasonable for the purpose of the funding valuation, i.e., determining the funded status of the plan and future contribution requirements to adequately fund the plan. Nonetheless, this report must be prepared in accordance with the applicable state law, including the statutory investment return assumption of 8.5 percent. However, in order to demonstrate the potential impact of the recently recommended set of economic assumptions, including a 7.5 percent investment return assumption, the key valuation results are also shown using our recommended set of economic assumptions for illustrative purposes (see page 74). The unfunded actuarial liability increases from $6.36 billion to $9.27 billion and the contribution deficiency increases from 2.50 percent to 7.40 percent.

Experience for the Last Plan Year

Numerous factors contributed to the change in assets, liabilities and actuarial contribution rate between July 1, 2016, and July 1, 2017. The components are examined in the following discussion.

Assets

The market value of assets is not used directly in the calculation of the unfunded actuarial accrued liability and the Required Contribution Rate (actuarial contribution rate). An asset valuation method, which smoothes the effect of market fluctuations, is used to determine the value of assets used in the valuation, called the "actuarial value of assets." In this year's valuation, the actuarial value of assets as of June 30, 2017 was $21.1 billion, an increase of $0.9 billion from the value in the prior valuation. The components of change in the asset values are shown in the following table:

(dollars in millions)	Fair Value	Actuarial Value
Net Position, June 30, 2016	**$19,420**	**$20,197**
Employer & Member Contributions	+ $765	+ $765
Benefit Payments and Administrative Expenses	– $1,789	– $1,789
Investment Income	+2,857	+ $1,893
Net Position, June 30, 2017	**$21,253**	**$21,063**
Asset Return	**15.1%**	**9.6%**

On a market value basis, the rate of return was 15.1 percent as reported by the State Board of Investment (SBI). Due to the application of the asset smoothing method, including the scheduled recognition of the deferred investment experience, the rate of return, measured on the actuarial value of assets, was 9.6 percent. Because this rate of return was higher than the assumed rate of return for this period of 8.0 percent, there was an actuarial gain of $303 million. Please see page 92 of this report for more detailed information on the fair (market) and actuarial value of assets.

Liabilities

The actuarial accrued liability is that portion of the present value of future benefits that will not be paid by future normal costs. The difference between this liability and the actuarial value of assets at the same date is called the unfunded actuarial accrued liability (UAAL). The dollar amount of unfunded actuarial accrued liability is reduced if the contributions to the System exceed the normal cost for the year plus interest on the prior year's UAAL.

The unfunded actuarial accrued liability is shown as of July 1, 2017, in the following table.

(dollars in millions)	Fair Value of Assets	Actuarial Value of Assets
Actuarial Accrued Liability	$27,428	$27,428
Value of Assets	$21,253	$21,063
Unfunded Actuarial Accrued Liability	$ 6,174	$ 6,365
Funded Ratio	77.49%	76.79%

See page 94 of the report for the detailed development of the unfunded actuarial accrued liability.

Changes in the UAAL occur for various reasons. The net increase in the UAAL from July 1, 2016, to July 1, 2017, was $157 million. The components of this net change are shown in the table below.

(dollars in millions)

Unfunded Actuarial Accrued Liability, July 1, 2016	**$6,522**
Expected increase from amortization method	$32
Expected increase from contributions below required rate	140
Investment experience	(303)
Liability experience	69
Other experience	9
Assumption changes	(104)
Subtotal	(157)
Unfunded Actuarial Accrued Liability, July 1, 2017	**$6,365**

As shown above, various components impacted the UAAL. Actuarial gains (losses), which result from actual experience that is more (less) favorable than anticipated based on the actuarial assumptions, are reflected in the UAAL and are measured as the difference between the expected unfunded actuarial accrued liability and the actual unfunded actuarial accrued liability, taking into account any changes due to actuarial assumptions and methods or benefit provision changes. Overall, the System experienced a net actuarial gain of $234 million. The actuarial gain may be explained by considering the separate experience of assets and liabilities. As noted earlier, there was a $303 million gain on the actuarial value of assets and a $69 million loss on liabilities. Due to the 15 percent return on the market value of assets, the funded ratio is projected to reach 90 percent and trigger the COLA increase from 2.0 percent to 2.5 percent in 2045. This created an actuarial loss on liabilities as the prior valuation did not assume an increase in the COLA would occur.

An evaluation of the unfunded actuarial accrued liability on a pure dollar basis may not provide a complete analysis since only the difference between the assets and liabilities (which are both very large numbers) is reflected. Another way to evaluate the unfunded actuarial accrued liability and the progress made in its funding is to track the funded ratio, the ratio of the actuarial value of assets to the actuarial accrued liability. Note that if the funded status were calculated using the market value of assets, the results could differ. The funded ratios and unfunded actuarial accrued liability measures, as shown, are not indicative of whether or not the System could settle all current benefit obligations with existing assets. Furthermore, these results do not, on their own, indicate whether or not future funding of the System will be required, nor the amount. The funded status information is shown below.

(dollars in millions)

Date	Funded Ratio	Unfunded Actuarial Accrued Liability
7/1/13	71.6%	$6,644
7/1/14	74.1%	$6,347
7/1/15	77.1%	$5,865
7/1/16	75.6%	$6,522
7/1/17	76.8%	$6,365

Contribution Rate

Under the Entry Age Normal cost method, the actuarial contribution rate consists of three components:

- a "normal cost" for the portion of projected liabilities allocated by the actuarial cost method to service of members during the year following the valuation date,
- an "unfunded actuarial accrued liability contribution" for the excess of the portion of projected liabilities allocated to service to date over the actuarial value of assets (unfunded actuarial accrued liability); and
- an amount to cover estimated administrative expenses for the plan year.

See page 96 of the report for the detailed development of these contribution rates is shown in the following table.

Contribution Rates	July 1, 2017	July 1, 2016
Normal Cost Rate	8.77%	8.79%
UAAL Contribution Rate	9.41%	9.70%
Expenses	0.25%	0.23%
Total Required Contribution	18.43%	18.72%
Statutory Contribution Rate	15.93%	15.94%
Deficiency	(2.50%)	(2.78%)

When a system is funded with a fixed contribution rate (Statutory Contribution Rate), it is expected that the fixed contribution rate may be either higher or lower than the actuarial contribution rate (Required Contribution Rate for TRA) as determined in the actuarial valuation each year. However, when the Statutory Contribution Rate is consistently lower than the Required Contribution Rate for a long period, it can significantly impact the funding progress of the system and result in an increasing UAAL and declining funded ratio. For TRA, the Statutory Contribution Rate has been significantly below the Required Contribution Rate for more than ten years. Over this time, the funded status of the system has declined from 92 percent to 77 percent. Actual investment experience over this time period also had a significant impact on the system's funding, but the long-term continuation of actual contributions that are significantly less than the actuarial contribution rate is a concern from an actuarial standpoint. Additional analysis of the long-term funding of the system should be performed to address what, if any, changes should be made to ensure the health of the retirement system.

The actuarial contribution rate (Required Contribution Rate) is determined based on the snapshot of the System taken on the valuation date, July 1, 2017. The actuarial contribution rate in future years will change each year as the deferred actuarial investment experience is recognized and other experience (both investment and demographic) impacts the System. The most volatile component of the actuarial contribution rate is typically the actual investment return, although the asset smoothing method helps to dampen the impact. Further, the date the funded ratio is projected to reach 90 percent for two consecutive years, triggering the increase in the COLA from 2.0 percent to 2.5 percent, can move significantly with the actual investment return on the market value of assets. As a result, actual investment returns above the assumed rate of return tend to move the projected date forward and increase the actuarial accrued liability, while actual investment returns below the expected return extend the projected date, lowering the actuarial accrued liability. This interactive dynamic between liabilities and asset performance somewhat dampens the impact of investment return volatility on the System's funding.

Summary

The investment return on the fair value of assets for FY 2017 was 15.1 percent, as reported by SBI. However, due to the application of the asset smoothing method, the return on the actuarial value of assets was 9.6 percent. Since this return was above the assumed rate of return for fiscal year 2017 (8.0 percent), there was an actuarial gain on the actuarial value of assets and the funded ratio increased from 75.59 percent in last year's valuation to 76.79 percent this year.

As mentioned earlier, the System utilizes an asset smoothing method in the valuation process. While this is a common procedure for public retirement systems, it is important to identify the potential impact of the deferred investment experience. The asset smoothing method impacts only the timing of when the actual market experience is recognized in the valuation process. The net deferred investment gain of $0.2 billion represents about 1 percent of the fair value of assets.

The key valuation results from the July 1, 2017, actuarial valuation are shown below, using both actuarial and fair value of assets.

	Fair Value	Actuarial Value
Statutory Rate	15.93%	15.93%
Required Contribution		
Normal Cost	8.77%	8.77%
UAAL Contribution	9.13%	9.41%
Expenses	0.25%	0.25%
Total Required Contribution	18.15%	18.43%
Deficiency	(2.22%)	(2.50%)
UAAL (millions)	$6,174	$6,365
Funded Ratio	77.49%	76.79%

For purposes of the statutorily required actuarial valuation report for funding, the investment return assumption is set in statute. Currently, the assumption is 8.00 percent for the five year period from July 1, 2012, to June 30, 2017, and 8.50 percent thereafter. Although the TRA Board recommended a decrease to the long-term investment return assumption, the relevant sections of state law were not changed during the 2016 or 2017 legislative session. Therefore, the formal results in this report have been prepared using an investment return assumption of 8.50 percent, as prescribed in statute. As noted earlier, the TRA Board commissioned Cavanaugh Macdonald to perform a review of the economic assumptions used in the actuarial valuation. The findings and recommendations were provided to the Board at their November 2017 meeting. The report's findings represent our best estimate for the economic assumptions to be used in TRA's funding valuation, as set out below:

- Lower the investment return assumption from 8.50 percent to 7.50 percent.
- Lower price inflation from 2.75 percent to 2.50 percent.
- Lower payroll growth assumption from 3.50 percent to 3.00 percent.
- Lower the wage inflation component of the salary increase assumption from 3.50 percent to 2.85 percent for 10 years and 3.25 percent, thereafter.

The following table provides a summary of the key valuation measurements, on both an actuarial and market value basis, using the recommended set of economic assumptions. In addition, Minnesota Statutes, Section 356.215, Subdivision 11 addresses the recalculation of the established date for full funding when there is a change in the actuarial assumptions, benefit structure, or actuarial cost method that produces a net increase in the unfunded actuarial accrued liability (UAAL). If the recommended set of economic assumptions are adopted, it would result in a net increase in the UAAL so this section of statute would be applicable. Based on the required calculation in Minnesota Statutes, Section 356.215, Subdivision 11, the amortization period would be extended two years, from FY 2039 to FY 2041

(dollars in billions)	Valuation Results	Actuarial Value	Fair Value
Value of Assets	$21.06	$21.06	$21.25
Unfunded Actuarial Accrued Liability (UAAL)	$6.36	$ 9.27	$ 9.08
Actuarial Accrued Liability Funding Ratio	76.80%	69.40%	70.10%
Normal Cost Rate (% of pay)	8.77%	10.54%	10.54%
Amortization of UAAL (% of pay)	9.41%	12.54%	12.28%
Expenses (% of pay)	0.25%	0.25%	0.25%
Total Required Contribution (% of pay)	18.43%	23.33%	23.07%
Member and Employer Contributions (% of pay)	15.22%	15.22%	15.22%
State Aid	0.71%	0.71%	0.71%
Contribution Deficiency (% of pay)	-2.50%	-7.40%	-7.14%

**Reflects extension of amortization period to 24 years following Minnesota Statute Section 356.215, Subdivision 11.*

If the Total Required Contribution Rate using the recommended set of economic assumptions is calculated, based on the UAAL using the market value of assets, the Required Contribution Rate decreases to 23.07 percent and the resulting Contribution Deficiency is 7.14 percent.

The long-term financial health of this retirement System, like all retirement systems, is heavily dependent on two key items: (1) future investment returns and (2) contributions to the System. Changes were made by the 2010 Legislature to strengthen the funding of TRA and enhance its long-term sustainability. Contributions were increased by a total of 4 percent, phased in over four years beginning July 1, 2011, and benefit reductions were implemented. These changes, along with strong investment performance in several of the following years, significantly improved the projected long-term funding of the System. However, the assumption changes, coupled with some recent years of actual investment experience below the expected investment return have eroded some of this progress. If the recommended set of economic assumptions is changed in statute, the subsequent valuation results will reflect a significant decline in the funding of the system, without accompanying changes in contributions, benefits or both. It is important to note that it is the actual investment returns, not the assumed investment return, that will ultimately determine the cost to provide the promised benefits.

The complete *Actuarial Valuation Funding Report* is available on the TRA website at https://www.minnesotatra.org/images/pdf/2017%20MN%20TRA%20Funding%20Valuation%20Report.pdf

Reconciliation of Member Data*

Fiscal Year Ended June 30, 2017

	Active** Members	Former*** Members	Benefit Recipients**** Service Retirements	Disability Retirements	Survivors	Total
Members on July 1, 2016	80,530	45,530	57,891	521	5,091	189,563
New hires	5,767	-	-	-	-	5,767
Transfer to inactive	(4,358)	4,358	-	-	-	0
Transfer to active	1,564	(1,564)	-	-	-	0
Return from zero balance	497	17	-	-	-	514
Return from disability	18	1	-	-	-	19
Refunded	(252)	(657)	-	-	-	(909)
Refunded (non-payable)	(3)	(13)	-	-	-	(16)
Retirements	(1,874)	(497)	2,405	(55)	-	(21)
Benefits began	-	-	-	72	479	551
Benefits ended	-	-	-	(3)	(62)	(65)
Deaths	(38)	(42)	(1,299)	(17)	(248)	(1,644)
Adjustments	(40)	241	(8)	(1)	8	200
Net changes	1,281	1,844	1,098	(4)	177	4,396
Members on June 30, 2017	81,811	47,374	58,989	517	5,268	193,959

* *All figures in this chart were provided by the Teachers Retirement Association. Recipient counts include all pensions in force, including double counting of multiple benefit types. Service Retirements include Supplemental and Variable optional joint annuitants. We found these results to be reasonable.*

** *Active members include 3 Basic and 81,808 Coordinated members.*

*** *Former members include 12 Basic and 47,362 Coordinated members.*

**** *Benefit recipients include 3,835 Basic members and 60,939 Coordinated members.*

Former Member Statistics	Vested	Non-Vested	Total
Number	14,030	33,344	47,374
Average Age	48.5	46.0	46.8
Average Service (years)	7.6	0.9	2.9
Average annual benefits, with augmentation to Normal Retirement Date and Combined Service Annuity load	$10,500	NA	NA
Average refund value, with Combined Service Annuity load	$33,209	$2,919	$11,889

Statement of Fiduciary Net Position

Fiscal Year Ended June 30, 2017

(dollars in thousands)

Assets		Fair Value
Cash and short term investments		
Cash	$	6,751
Building account cash		41
Short-term investments		622,773
Total cash and short-term investments	$	629,565
Receivables		21,281
Investments (at fair value)		
Bond pool	$	4,098,977
Alternative investments pool		2,773,952
Indexed equity pool		0
Domestic equity pool		9,142,315
International stock fund		4,583,377
Total investments	$	20,598,621
Securities lending collateral		2,182,399
Building		
Land	$	171
Building and equipment – net of depreciation		6,251
Total building	$	6,422
Capital assets net of depreciation	$	16,797
Total Assets	**$**	**23,455,085**

Statement of Fiduciary Net Position *(continued)*

Fiscal Year Ended June 30, 2017

(dollars in thousands)

Liabilities	Fair Value
Current	
Accounts payable	$ 8,367
Accrued compensated absences	99
Accrued expenses - building	41
Bonds payable	616
Bonds interest payable	11
Securities lending collateral	2,182,399
Total current liabilities	$ 2,191,533
Long term	
Accrued compensated absences	$ 834
Bonds payable	4,628
Total long-term liabilities	$ 5,462
Total Liabilities	**$ 2,196,995**
Net Position Restricted for Pension Benefits	**$ 21,258,090**
Earnings Limitation Savings Account (ELSA) accounts payable*	(4,604)
Net Position Restricted, after adjustment for ELSA accounts	**$ 21,253,486**

** Not calculated by Cavanaugh Macdonald; TRA determined.*

Statement of Changes in Fiduciary Net Position

Fiscal Year Ended June 30, 2017

The following exhibit shows the revenue, expenses and resulting assets of the Fund as reported by the Teachers Retirement Association for the Plan's fiscal year July 1, 2016 to June 30, 2017.

(dollars in thousands)

Change in Assets		Fair Value
Additions		
Contributions		
Employee	$	361,175
Employer		367,791
Direct aid (state/city/county)		35,587
Earnings Limitation Savings Account (ELSA)		1,995
Total contributions	$	766,548
Investment income		
Investment appreciation in fair value	$	2,863,554
Less investment expenses		(22,060)
Net investment income	$	2,841,494
Securities lending activities		
Securities lending income	$	31,122
Securities lending expenses		
Borrowing rebates	$	(12,814)
Management fees		(4,584)
Total securities lending expenses		17,398)
Net income from securities lending		13,724
Total net investment income	$	2,855,218
Other income		2,404
Total additions	**$**	**3,624,170**
Deductions		
Benefits Paid		
Retirement benefits	$	(1,765,573)
Refunds of contributions to members		(11,241)
Total benefits paid	$	(1,776,814)
Administrative Expenses		(11,702)
Total deductions	$	(1,788,516)
Increase/(Decrease) in ELSA account value		**(2,299)**
Net position restricted for pensions	**$**	**1,833,355**
Beginning of year	**$**	**19,420,131**
End of year	**$**	**21,253,486**

Actuarial Value of Assets

Fiscal Year Ended June 30, 2017

(dollars in thousands)

1. Fair value of assets available for benefits				**$**	**21,253,486**
2. Determination of average balance					
a. Assets available at July 1, 2016*				$	19,424,431
b. Assets available at June 30, 2017*					21,258,090
c. Net investment income for fiscal year ending June 30, 2017					2,855,218
d. Average balance *[a. + b. - c.] / 2*				$	18,913,652
3. Expected return *[8.0 percent * 2.d.]*					1,513,092
4. Actual return					2,855,218
5. Current year unrecognized asset return					1,342,126
6. Unrecognized asset returns					
		Original Amount	**% Not Recognized**		
a. Year ended June 30, 2017	$	1,342,126	80%	$	1,073,701
b. Year ended June 30, 2016	$	(1,619,440)	60%	$	(971,664)
c. Year ended June 30, 2015	$	(706,091)	40%	$	(282,436)
d. Year ended June 30, 2014	$	1,855,481	20%	$	371,096
e. Total return not yet recognized				$	190,697
7. Actuarial value at June 30, 2017 *(1. - 6.e.)*				**$**	**21,062,789**

* *Before recognition of ELSA accounts payable.*

Actuarial Valuation Balance Sheet

Fiscal Year Ended June 30, 2017

The actuarial balance sheet is based on the fundamental equation that, at any given time, the present value of benefits to be paid in the future must be equal to the assets on hand plus the present value of future contributions to be received. The total rate of contribution is determined as that amount which will make the total present and potential assets balance with the total present value of future benefits.

The contributions made in excess of amounts required for current benefit payments are accumulated as a reserve to help meet benefit payments in later years. This reserve fund enables the establishment of a level rate of contribution each year.

(dollars in thousands)

A. Actuarial Value of Assets			$ 21,062,789
B. Expected Future Assets			
1. Present value of expected future statutory supplemental contributions*			$ 4,673,992
2. Present value of expected future normal cost contributions			4,443,307
3. Total expected future assets *(1. + 2.)*			$ 9,117,299
C. Total Current and Expected Future Assets**			$ 30,180,088
D. Current Benefit Obligations	Non-Vested	Vested	Total
1. Benefit recipients			
a. Service retirements	$ 0	$ 16,397,276	$ 16,397,276
b. Disability	0	147,962	147,962
c. Survivors	0	1,089,032	1,089,032
2. Deferred retirements with augmentation to Normal Retirement Date	0	618,289	618,289
3. Former members without vested rights***	97,331	0	97,331
4. Active members	63,845	7,529,032	7,592,877
5. Total current benefit obligations	$ 161,176	$ 25,781,591	$ 25,942,767
E. Expected Future Benefit Obligations			$ 5,928,242
F. Total Current and Expected Future Benefit Obligations			$ 31,871,009
G. Unfunded Current Benefit Obligations *(D.5 – A)*			$ 4,879,978
H. Unfunded Current and Future Benefit Obligations *(F. – C.)*			$ 1,690,921

* *Under LCPR guidelines, this amount does not include supplemental payments, which could occur after the expiration of the remaining 22-year amortization period.*

** *Does not reflect deferred investment experience in the asset smoothing method. Total expected future assets on a fair value basis are $30,370,785.*

*** *Former members with insufficient service to vest who have not collected a refund of member contributions as of the valuation date.*

Determination of Unfunded Actuarial Accrued Liability (UAAL) and Supplemental Contribution Rate

July 1, 2017

(dollars in thousands)	Actuarial Present Value of Projected Benefits	Actuarial Present Value of Future Normal Costs	Actuarial Accrued Liability
A. Determination of Actuarial Accrued Liability (AAL)			
1. Active Members			
a. Retirement annuities	$ 12,688,479	$ (3,642,037)	$ 9,046,442
b. Disability benefits	277,323	(113,219)	164,104
c. Survivor benefits	102,406	(37,723)	64,683
d. Deferred retirements	435,205	(488,401)	(53,196)
e. Refunds	17,706	(161,927)	(144,221)
f. Total	$ 13,521,119	$ (4,443,307)	$ 9,077,812
2. Deferred retirements with future augmentation to Normal Retirement Age	618,289	0	618,289
3. Former members without vested rights	97,331	0	97,331
4. Benefit recipients	17,634,270	0	17,634,270
5. Total	$ 31,871,009	$ (4,443,307)	$ 27,427,702

B. Determination of Unfunded Actuarial Accrued Liability (UAAL)*	
1. Actuarial accrued liability	$ 27,427,702
2. Actuarial value of assets (page 92, line 7)	21,062,789
3. Unfunded actuarial accrued liability	$ 6,364,913
C. Determination of Supplemental Contribution Rate*	
1. Present value of future payrolls through the amortization date of June 30, 2039	$ 67,640,988
2. Supplemental contribution rate *(A.3/B.1)***	9.41%

* *On a fair value of assets basis, the unfunded actuarial accrued liability is $6,174,216 and the supplemental contribution rate is 9.13 percent of payroll.*

** *The amortization factor as of July 1, 2017 is 13.4115.*

Changes in Unfunded Actuarial Accrued Liability

Fiscal Year Ended June 30, 2017

(dollars in thousands)		Amount
A. Unfunded actuarial accrued liability at beginning of year	$	6,521,937
B. Changes due to interest requirements and current rate of funding*		
1. Normal cost and actual administrative expenses	$	438,803
2. Contributions		(766,548)
3. Interest on A., B.1 and B.2		508,897
4. Total *(B.1. + B.2. + B.3.)*	$	181,152
C. Expected unfunded actuarial accrued liability at end of year *(A. + B.4.)*	$	6,703,089
D. Increase (decrease) due to actuarial losses (gains) because of experience deviations from expected		
1. Salary increases	$	(123,825)
2. Investment return (AVA)		(302,867)
3. Mortality of active members		(1,640)
4. Mortality of benefit recipients		(10,219)
5. Retirement from active service		58,987
6. Change in date COLA is expected to increase		128,178
6. Other items		17,504
7. Total	$	(233,882)
E. Unfunded actuarial accrued liability at end of year before plan amendments and changes in actuarial assumptions *(C. + D.7.)*	$	6,469,207
F. Change in unfunded actuarial accrued liability due to change in assumption regarding Combined Service Annuity load factors		(104,294)
G. Unfunded actuarial accrued liability at end of year *(E. + F.)*	$	6,364,913

* *The amortization of the unfunded actuarial accrued liability (UAAL) using the current amortization method results in initial payments less than the "interest only" payment on the UAAL. Payments less than the interest only amount will result in the UAAL increasing in the absence of actuarial gains.*

Determination of Contribution Sufficiency/(Deficiency) — Total

July 1, 2017

The annual required contribution (ARC) is the sum of the normal cost, a supplemental contribution to amortize the UAAL, and an allowance for expenses.

(dollars in thousands)	Percent of Payroll	Dollar Amount
A. Statutory Contributions - Chapter 354		
1. Employee contributions	7.50%	$ 378,272
2. Employer contributions*	7.72%	389,379
3. Supplemental contributions**		
a. 1993 Legislation	0.10%	5,000
b. 1996 Legislation	0.06%	3,256
c. 1997 Legislation	0.26%	12,954
d. 2014 Legislation	0.29%	14,377
4. Total	15.93%	$ 803,238
B. Required Contributions - Chapter 356		
1. Normal Cost		
a. Retirement benefits	7.25%	$ 365,673
b. Disability benefits	0.21%	10,593
c. Survivor	0.08%	4,036
d. Deferred retirement benefits	0.90%	45,393
e. Refunds	0.33%	16,645
f. Total	8.77%	$ 442,340
2. Supplemental contribution amortization by July 1, 2039 of Unfunded Actuarial Accrued Liability	9.41%	$ 474,593
3. Allowance for expenses	0.25%	12,609
4. Total annual contribution for fiscal year ending June 30, 2018***	18.43%	$ 929,542
C. Contribution Sufficiency/(Deficiency) *(A.4 - B.4)****	(2.50%)	$ (126,304)
Note: Projected annual payroll for fiscal year beginning on the valuation date		$ 5,043,499

* *Employer contribution rate is blended to reflect rates of 15.14 percent of pay for Basic members, 7.50 percent for pay for Coordinated members not employed by Special School District #1, and 11.14 percent of pay for Coordinated members who are employed by Special School District #1.*

** *Includes contributions from Special School District #1 and the City of Minneapolis, matching state contributions.*

*** *On a fair value of assets basis, the total required contribution is 18.15 percent of payroll and the contribution deficiency is 2.22 percent of payroll.*

Solvency Test

(dollars in thousands)

	Aggregate Accrued Liabilities						
Valuation as of June 30	(1) Member Contributions	(2) Retirees and Beneficiaries	(3) Members (Employer Financed Portion)	Valuation Assets	Portion of Actuarial Accrued Liabilities Covered by Reported Assets (1)	(2)	(3)
2008	$ 1,883,371	$ 13,567,065	$ 6,780,405	$ 18,226,985	100%	100%	40.9%
2009	$ 2,038,749	$ 14,203,926	$ 6,872,127	$ 17,882,408	100%	100%	23.9%
2010	$ 2,128,600	$ 13,650,631	$ 6,302,403	$ 17,323,146	100%	100%	24.5%
2011	$ 2,308,427	$ 13,964,552	$ 5,898,514	$ 17,132,383	100%	100%	14.6%
2012	$ 2,407,626	$ 14,664,333	$ 5,952,546	$ 16,805,077	100%	98.2%	0.0%
2013	$ 2,482,123	$ 15,145,239	$ 5,791,267	$ 16,774,626	100%	94.4%	0.0%
2014	$ 2,510,604	$ 15,798,610	$ 6,219,292	$ 18,181,932	100%	99.2%	0.0%
2015	$ 2,637,237	$16,500,275	$ 6,424,643	$ 19,696,893	100%	100%	8.7%
2016	$ 3,033,160	$ 17,187,332	$ 6,495,724	$ 20,194,279	100%	99.8%	0.0%
2017	$ 3,246,851	$ 17,634,270	$ 6,546,581	$ 21,062,789	100%	100%	2.8%

Schedule of Active Member Valuation Data

Year Ended June 30	Active Members	*($ in thousands)* Annual Covered Payroll	% Increase in Covered Payroll	Average Annual Member Salary
2008	76,515	$3,645,230	3.2%	$47,641
2009	77,162	$3,761,484	3.2%	$48,748
2010	77,356	$3,787,757	0.7%	$48,965
2011	76,755	$3,838,111	1.3%	$50,005
2012	76,649	$3,871,809	0.9%	$50,514
2013	76,765	$3,917,310	1.2%	$51,030
2014	77,243	$4,056,482	3.5%	$52,516
2015	79,406	$4,306,426	6.2%	$54,233
2016	80,530	$4,515,699	4.9%	$56,075
2017	81,811	$4,688,875	3.8%	$57,314

Schedule of Retirees and Beneficiaries Added To and Removed From Retirement Rolls

Through June 1, 2017 – End of Budget Year for Benefit Payments – Prepared by TRA***

	Added To Rolls		Removed From Rolls		June 1 Payment		
Fiscal Year	Number	Annual Allowances	Number	Annual Allowances	Number	Annual Allowances	Avg. Annual Allowances
2017							
Retirement	2,362	$ 67,444,049	1,264	$ 38,365,148	58,632	$ 1,608,549,654	$ 27,436
Disability	73	$ 1,774,135	75	$ 1,683,296	536	$ 11,352,435	$ 21,180
Beneficiaries	512	$ 13,397,711	327	$ 8,017,689	5,562	$ 150,944,018	$ 27,124
2016							
Retirement	2,700	$ 74,501,674	1,253	$ 40,121,659	57,534	$ 1,559,304,348	$ 27,102
Disability	56	$ 1,333,271	101	$ 1,987,290	538	$ 11,126,018	$ 20,680
Beneficiaries	569	$ 13,400,450	282	$ 6,445,318	5,377	$ 142,825,257	$ 26,562
2015*							
Retirement	3,901	$139,486,500	1,219	$ 113,360,695	56,087	$ 1,507,085,583	$ 26,871
Disability	91	$ 4,201,093	74	$ 5,046,531	583	$ 11,561,844	$ 19,832
Beneficiaries	623	$ 25,490,532	269	$ 17,055,001	5,090	$ 134,071,302	$ 26,340
2014							
Retirement	2,657	$ 72,823,770	1,082	$ 33,357,350	53,405	$ 1,438,959,431	$ 26,944
Disability	71	$ 1,371,630	76	$ 1,731,701	566	$ 10,884,969	$ 19,231
Beneficiaries	428	$ 11,562,063	217	$ 4,779,599	4,736	$ 123,918,462	$ 26,165
2013							
Retirement	2,719	$ 73,367,192	1,079	$ 33,267,557	51,830	$ 1,393,126,889	$ 26,879
Disability	54	$ 1,049,388	80	$ 1,799,928	571	$ 11,051,118	$ 19,354
Beneficiaries	449	$ 11,519,816	237	$ 6,491,835	4,525	$ 116,204,127	$ 25,680
2012							
Retirement	2,770	$ 77,169,833	1,040	$ 30,234,280	50,193	$ 1,342,791,637	$ 26,753
Disability	72	$ 1,481,314	80	$ 1,816,246	597	$ 11,565,197	$ 19,372
Beneficiaries	402	$ 11,820,962	213	$ 3,969,446	4,310	$ 110,302,448	$ 25,592
2011							
Retirement	2,573	$ 71,896,835	1,012	$ 30,381,621	48,463	$ 1,320,885,728	$ 27,256
Disability	59	$ 1,365,130	72	$ 1,841,934	605	$ 11,896,607	$ 19,664
Beneficiaries	400	$ 9,199,307	224	$ 4,179,950	4,121	$ 104,083,869	$ 25,257
2010							
Retirement	2,034	$ 57,221,454	922	$ 28,024,798	46,902	$ 1,296,882,008	$ 27,651
Disability	51	$ 1,283,512	67	$ 1,578,194	618	$ 12,400,315	$ 20,065
Beneficiaries	391	$ 9,945,588	193	$ 4,237,320	3,945	$ 100,367,532	$ 25,442
2009							
Retirement	2,282	$ 65,082,777	874	$ 25,678,679	45,790	$ 1,271,277,327	$ 27,763
Disability	48	$ 959,551	26	$ 507,524	634	$ 12,364,085	$ 19,502
Beneficiaries	343	$ 7,938,855	213	$ 2,997,929	3,747	$ 94,308,262	$ 25,169
2008**							
Retirement	7,757	$267,146,737	1,580	$ 95,109,782	44,382	$ 1,231,768,186	$ 27,754
Disability	105	$ 2,596,324	93	$ 2,408,229	612	$ 11,635,841	$ 19,011
Beneficiaries	585	$ 24,054,314	398	$ 10,168,388	3,617	$ 93,067,932	$ 25,730

**2015 data reflects higher additions and removals associated with the conversion of former DTRFA benefit recipient rolls into TRA benefit payment systems.*

***2008 data reflects higher additions, removals and fiscal year 2009 data adjustments associated with the conversion of former MTRFA benefit recipient rolls into TRA benefit payment systems.*

****Timing differences exist between the data used for statistical information and that used for actuarial valuation purposes.*

Schedule of Funding Progress (Unaudited)

Dollar Amounts in Thousands

Actuarial Valuation Date	Actuarial Value of Assets (A)	Actuarial Accrued Liability (AAL) (B)	Unfunded AAL (UAAL) (B–A)	Funded Ratio (A / B)	Actual Covered Payroll (Previous FY) (C)	UAAL as Percentage of Covered Payroll (B–A) / (C)
07/01/08	$18,226,985	$22,230,841	$ 4,003,856	81.99%	$3,645,230	109.84%
07/01/09	$17,882,408	$23,114,802	$ 5,232,394	77.36%	$3,761,484	139.10%
07/01/10	$17,323,146	$22,081,634	$ 4,758,488	78.45%	$3,787,757	125.63%
07/01/11	$17,132,383	$22,171,493	$ 5,039,110	77.27%	$3,838,111	131.29%
07/01/12	$16,805,077	$23,024,505	$ 6,219,428	72.99%	$3,871,809	160.63%
07/01/13	$16,774,626	$23,418,629	$ 6,644,003	71.63%	$3,917,310	169.61%
07/01/14	$18,181,932	$24,528,506	$ 6,346,574	74.13%	$4,056,482	156.46%
07/01/15	$19,696,893	$25,562,155	$ 5,865,262	77.05%	$4,306,426	136.20%
07/01/16	$20,194,279	$26,716,216	$ 6,521,937	75.59%	$4,515,699	144.43%
07/01/17	$21,062,789	$27,427,702	$ 6,364,913	76.79%	$4,688,875	135.74%

Schedule of Contributions From the Employer and Other Contributing Entities (Unaudited)

Dollar Amounts in Thousands

Year End June 30	Actuarially* Required Contribution Rate (a)	Actual Covered Payroll (b)	Actual Member Contributions (c)	ARC Annual Required Contributions [(a) x (b)] - (c)	Actual Employer Contribution	Percentage Contributed
2008	13.44%	$ 3,645,230	$ 209,592	$ 280,327	$ 231,562	82.60%
2009	15.08%	$ 3,761,484	$ 212,043	$ 355,189	$ 240,718	67.72%
2010	16.81%	$ 3,787,757	$ 214,909	$ 421,813	$ 242,088	57.39%
2011	15.71%	$ 3,838,111	$ 218,024	$ 384,943	$ 244,233	63.45%
2012	16.57%	$ 3,871,809	$ 239,834	$ 401,725	$ 266,661	66.38%
2013	18.75%	$ 3,917,310	$ 270,708	$ 463,788	$ 290,662	62.67%
2014	19.41%	$ 4,056,482	$ 294,632	$ 492,731	$ 320,301	65.01%
2015	19.15%	$ 4,261,626	$ 331,905	$ 484,196	$ 358,367	74.01%
2016	17.86%	$ 4,515,699	$ 347,256	$ 459,699	$ 390,548	84.96%
2017	18.72%	$ 4,688,875	$ 361,175	$ 516,582	$ 403,378	78.09%
2018	18.43%					

**Actuarially Required Contributions calculated according to parameters of GASB 25.*

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Teachers Retirement Association of Minnesota
A Pension Trust Fund of the State of Minnesota

Statistical

Statistical Summary

TRA complies with GASB Statement No. 44, Economic Condition Reporting: The Statistical Section, issued in May 2004. The pronouncement establishes and modifies requirements related to the supplementary information presented in this section of the report. This section of the report provides detailed information about TRA as a context for understanding what the information in the financial statement note disclosures and required supplementary information indicates about the Association's overall financial condition.

The schedules and graphs beginning on page 103 show trend information about the growth of TRA assets over the past 10 years. These schedules, and others, provide detailed information about the trends of key sources of additions and deductions to plan assets.

The Contribution Rate chart on page 103 provides historical information on the total member and employer contribution rates.

The schedule of Pension Assets Compared to Pension Liabilities, found on pages 104-105, show the funding progress of the plan for the past 10 years on accumulating assets to cover projected pension liabilities which will ultimately be due at retirement.

The schedules on pages 106-107 and 108-111 include detailed information regarding the number and type of benefit recipients, and information as to the benefit amount.

The chart on page 112 provides a profile of TRA active members on June 30, 2017, by age and service credit totals.

The chart on page 113 contains information on the total number of members by type.

The schedules on pages 114-115 detail the largest TRA employer units by covered employees and by types of employer.

All data is derived from TRA internal sources and the actuarial consultant.

The projected benefit payments (page 119) for the next 25 years have been supplied by TRA's actuarial advisor, Cavanaugh Macdonald Consulting.

10-Year History of TRA Fiduciary Net Position

June 30 Fiscal Year End	Fiduciary Net Position	% Change From Prior Year
2008	$18,106,965,760	-9.2%
2009	$13,833,825,733	-23.6%
2010	$14,939,539,780	8.0%
2011	$17,303,575,561	15.8%
2012	$16,689,940,629	-3.6%
2013	$18,019,318,901	8.0%
2014	$20,293,684,479	12.6%
2015	$20,446,090,732	0.8%
2016	$19,424,431,199	-5.0%
2017	$21,258,090,428	9.4%

10-Year History of TRA Contribution Rates

Fiscal Year	Basic Program Employee Contribution Rate	Basic Program Employer Contribution Rate	Basic Program Total Contribution Rate	Coordinated Employee Contribution Rate	Coordinated Employer Contribution Rate	Coordinated Total Contribution Rate
2008	9.00%	9.50%	18.50%	5.50%	5.50%	11.00%
2009	9.00%	9.50%	18.50%	5.50%	5.50%	11.00%
2010	9.00%	9.50%	18.50%	5.50%	5.50%	11.00%
2011	9.00%	9.50%	18.50%	5.50%	5.50%	11.00%
2012	9.50%	10.00%	19.50%	6.00%	6.00%	12.00%
2013	10.00%	10.50%	20.50%	6.50%	6.50%	13.00%
2014	10.50%	11.00%	21.50%	7.00%	7.00%	14.00%
2015	11.00%	11.50%	22.50%	7.50%	7.50%	15.00%
2016	11.00%	11.50%	22.50%	7.50%	7.50%	15.00%
2017	11.00%	11.50%	22.50%	7.50%	7.50%	15.00%

Teachers Retirement Association
10-Year History of Changes in Fiduciary Net Position

Fiscal Year ended June 30	2008	2009	2010	2011
Additions				
Member Contributions	$ 209,592,461	$ 212,042,535	$ 214,908,960	$ 218,023,736
Employer Contributions	231,561,322	240,718,200	242,087,985	244,232,711
Net Income (Loss) From Investing Activity	(926,044,140)	(3,318,368,290)	2,087,639,841	3,390,130,615
Other Income, Net	7,529,753	6,526,400	4,850,206	5,562,374
Total Additions to Fiduciary Net Position	$ (477,360,604)	$ (2,859,081,155)	$ 2,549,486,992	$ 3,857,949,436
Deductions				
Pension Benefits	$ 1,330,836,947	$ 1,383,667,466	$ 1,422,578,335	$ 1,460,836,392
Refunds	11,770,086	14,429,351	11,607,086	23,812,985
Administrative Expenses	10,261,139	10,608,003	9,587,524	9,264,278
Other	1,687,335	5,354,052	0	0
Total Deductions from Fiduciary Net Position	$ 1,354,555,508	$ 1,414,058,872	$ 1,443,772,945	$ 1,493,913,655
Net Increase (Decrease)	$ (1,831,916,112)	$ (4,273,140,027)	$ 1,105,714,047	$ 2,364,035,781
Net Position Held in Trust, Beginning of Year	$ 19,938,881,872	$ 18,106,965,760	$ 13,833,825,733	$ 14,939,539,780
Net Position Held in Trust, End of Year	$ 18,106,965,760	$ 13,833,825,733	$ 14,939,539,780	$ 17,303,575,561

***"Net position held in trust, beginning of year" were restated to reflect $226,071,060 of assets assumed as a result of merger with DTRFA.*

10-Year History of Pension Assets vs. Pension Liabilities

Fiscal Year ended June 30	2008	2009	2010	2011
Pension Assets (Actuarial Value)	$ 18,226,985,000	$ 17,882,408,000	$ 17,323,146,000	$ 17,132,383,000
Accrued Liabilities	$ 22,230,841,000	$ 23,114,802,000	$ 22,081,634,000	$ 22,171,493,000
Unfunded Liabilities (Sufficiency)	$ (4,003,856,000)	$ (5,232,394,000)	$ (4,758,488,000)	$ (5,039,110,000)
Funded Ratio	82.0%	77.4%	78.5%	77.3%

10-Year History of Changes in Fiduciary Net Position *(cont'd)*

2012	2013	2014	2015*	2016	2017
$ 239,833,920	$ 265,808,686	$ 294,632,331	$ 334,825,844	$ 347,255,904	$ 361,175,007
266,661,085	290,662,108	320,300,846	381,795,000	390,548,550	403,378,849
383,187,159	2,310,295,407	3,257,692,629	887,280,400	(23,671,593)	2,855,217,246
4,929,201	5,474,846	5,502,381	4,896,887	5,529,450	4,398,569
$ 894,611,365	$ 2,872,241,047	$ 3,878,128,187	$ 1,608,798,131	$ 719,662,311	$ 3,624,169,671
$ 1,486,386,832	$ 1,523,269,003	$ 1,581,766,643	$ 1,659,068,988	$ 1,718,693,913	$ 1,767,567,858
11,835,977	10,462,932	12,566,217	11,884,677	11,289,626	11,240,388
10,023,488	9,130,840	9,429,749	11,509,273	11,338,305	11,702,196
0	0	0	0	0	0
$ 1,508,246,297	$ 1,542,862,775	$ 1,603,762,609	$ 1,682,462,938	$ 1,741,321,844	$ 1,790,510,442
$ (613,634,932)	$ 1,329,378,272	$ 2,274,365,578	$ (73,664,807)	$ (1,021,659,533)	$ 1,833,659,229
$ 17,303,575,561	$ 16,689,940,629	$ 18,019,318,901	$ 20,519,755,539	$ 20,446,090,732	$ 19,424,431,199
$ 16,689,940,629	$ 18,019,318,901	$ 20,293,684,479	$ 20,446,090,732	$ 19,424,431,199	$ 21,258,090,428

10-Yr History/Pension Assets vs. Pension Liabilities *(cont'd)*

2012	2013	2014	2015	2016	2017
$ 16,805,077,000	$ 16,774,626,000	$ 18,181,932,000	$ 19,696,893,000	$ 20,194,279,000	$ 21,062,789,000
$ 23,024,505,000	$ 23,418,629,000	$ 24,528,506,000	$ 25,562,155,000	$ 26,716,216,000	$ 27,427,702,000
$ (6,219,428,000)	$ (6,644,003,000)	$ (6,346,574,200)	$ (5,865,262,000)	$ (6,521,937,000)	$ (6,364,913,000)
73.0%	71.6%	74.1%	77.1%	75.6%	76.8%

10-Year History of TRA Benefits and Refunds by Type

Fiscal year ended June 30

Pension Benefits	2008	2009	2010	2011
Annuities	$ 1,297,772,858	$ 1,352,741,935	$ 1,391,181,476	$ 1,429,842,960
Disabilities	12,049,579	12,076,621	13,075,898	12,468,933
Survivor Benefits	17,460,466	16,547,705	17,124,339	17,237,783
Total Pension Benefits	$ 1,327,282,903	$ 1,381,366,261	$ 1,421,381,713	$ 1,459,549,676
Annuities Redirected to Earnings Limitation Savings Account (ELSA)	$ 3,554,045	$ 2,301,205	$ 1,196,622	$ 1,286,716
Member Refunds				
Regular	8,567,474	8,631,754	6,808,991	7,669,337
Death	995,710	1,967,544	1,272,971	989,888
ELSA Refunds	1,860,826	3,550,729	3,341,302	14,947,274
Employer Refunds	346,076	279,324	183,822	206,486
Total Refunds	$ 11,770,086	$ 14,429,351	$ 11,607,086	$ 23,812,985
Total Benefits and Refunds	$ 1,342,607,034	$ 1,398,096,817	$ 1,434,185,421	$ 1,484,649,377

10-Year History of TRA Benefit Recipients by Category

Fiscal year ended June 30

Year	Annuitants	Disabilitants	Survivors	Total
2008	43,041	641	3,299	46,981
2009	46,009	624	3,575	50,208
2010	47,556	615	3,682	51,853
2011	49,079	602	3,856	53,537
2012	50,780	591	4,054	55,425
2013	52,331	568	4,269	57,168
2014	53,774	563	4,472	58,809
2015	56,589	571	4,826	61,986
2016	57,892	521	5,092	63,505
2017	58,991	517	5,268	64,776

10-Year History of TRA Benefits and Refunds by Type *(cont'd)*

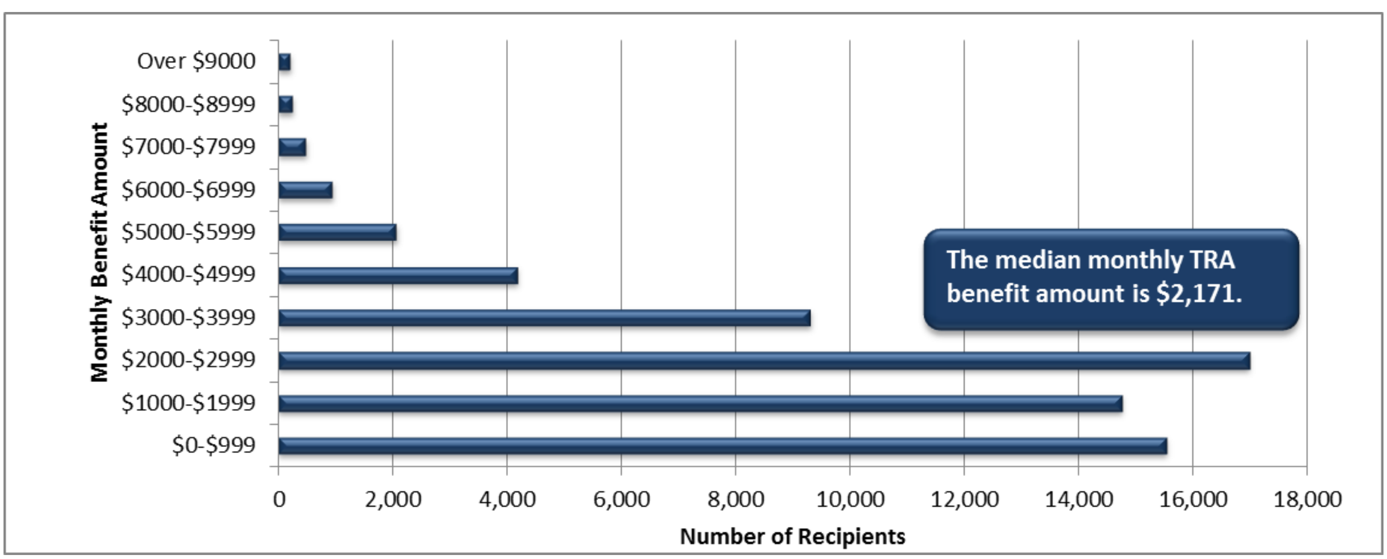
Fiscal year ended June 30

2012	2013	2014	2015	2016	2017
$ 1,456,295,613	$ 1,492,612,137	$ 1,551,120,554	$ 1,626,702,812	$ 1,687,085,465	$ 1,741,264,753
12,302,612	11,774,758	11,681,267	12,063,315	11,966,968	11,985,408
16,929,195	17,089,958	17,318,007	18,956,030	17,680,917	12,322,854
$ 1,485,527,420	$ 1,521,476,853	$ 1,580,119,828	$ 1,657,722,157	$ 1,716,733,350	$ 1,765,573,016
$ 859,412	$ 1,792,150	$ 1,646,815	$ 1,346,831	$ 1,960,563	$ 1,994,842
7,836,244	7,596,530	9,152,348	8,696,290	8,284,188	7,846,695
928,558	1,192,365	1,609,301	1,360,475	$ 1,183,915	$ 1,588,868
2,864,780	1,366,885	1,579,841	1,658,854	1,620,650	1,632,426
206,395	307,152	224,727	169,058	200,874	172,399
$ 11,835,977	$ 10,462,932	$ 12,566,217	$ 11,884,677	$ 11,289,626	$ 11,240,388
$ 1,498,222,809	$ 1,533,731,935	$ 1,594,332,860	$ 1,670,953,665	$ 1,729,983,539	$ 1,778,808,246

Schedule of TRA Benefit Amounts Paid

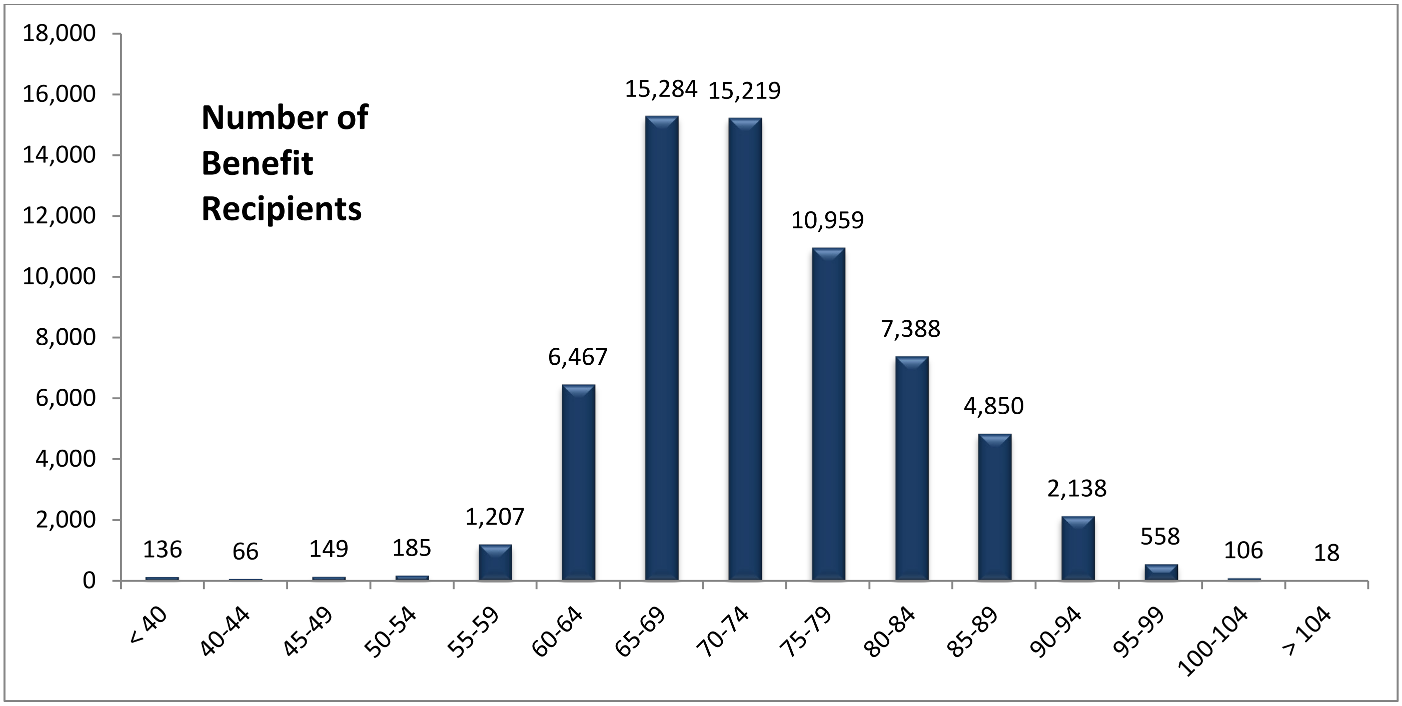
For Month of June 2017 – Payment Made June 1, 2017

Monthly Benefit Amount	Number of Recipients	Cumulative Total	Percent	Cumulative Percent
$ 0 – 499	8,962	8,962	13.85%	13.85%
$ 500 – 999	6,574	15,536	10.16%	24.00%
$ 1,000 – 1,499	6,582	22,118	10.17%	34.17%
$ 1,500 – 1,999	8,172	30,290	12.62%	46.79%
$ 2,000 – 2,499	8,955	39,245	13.83%	60.63%
$ 2,500 – 2,999	8,024	47,269	12.40%	73.02%
$ 3,000 – 3,499	5,705	52,974	8.81%	81.84%
$ 3,500 – 3,999	3,607	56,581	5.57%	87.41%
$ 4,000 – 4,499	2,465	59,046	3.81%	91.22%
$ 4,500 – 4,999	1,717	60,763	2.65%	93.87%
$ 5,000 – 5,499	1,233	61,996	1.90%	95.78%
$ 5,500 – 5,999	839	62,835	1.30%	97.07%
$ 6,000 – 6,499	564	63,399	0.87%	97.94%
$ 6,500 – 6,999	387	63,786	0.60%	98.54%
$ 7,000 – 7,499	275	64,061	0.42%	98.97%
$ 7,500 – 7,999	213	64,274	0.33%	99.30%
$ 8,000 – 8,499	139	64,413	0.21%	99.51%
$ 8,500 – 8,999	109	64,522	0.17%	99.68%
$ 9,000 – 9,499	64	64,586	0.10%	99.78%
$ 9,500 – 9,999	43	64,629	0.07%	99.84%
$ 10,000 – 10,499	32	64,661	0.05%	99.89%
$ 10,500 – 10,999	20	64,681	0.03%	99.92%
$ 11,000 – 11,499	19	64,700	0.03%	99.95%
$ 11,500 – 11,999	5	64,705	0.01%	99.96%
$ 12,000 – 12,499	11	64,716	0.02%	99.98%
$ 12,500 and over	14	64,730	0.02%	100.00%



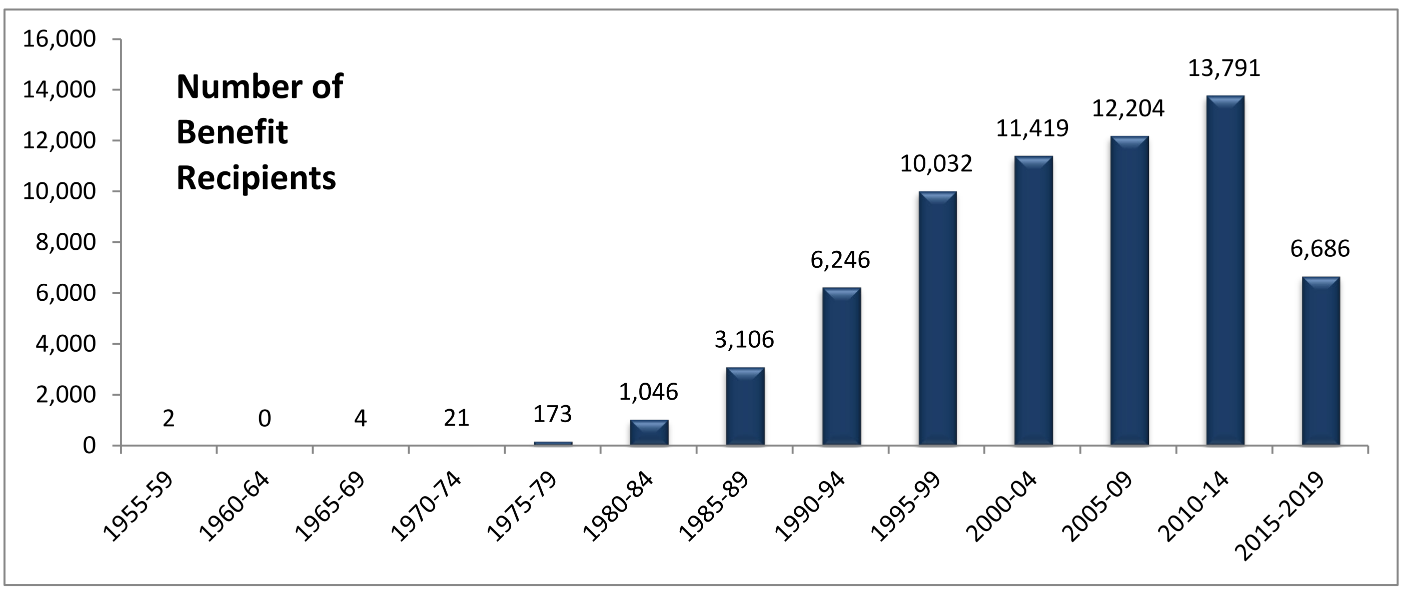
Schedule of TRA Benefit Recipients by Current Age

For Month of June 2017 – Payment Made June 1, 2017 | Total Recipients: 64,730



Benefit Recipients by Effective Date of Retirement

For Month of June 2017 – Payment Made June 1, 2017 | Total Recipients: 64,730



Schedule of New TRA Retirees and Initial Benefit Paid

For the Ten Fiscal Years Ending June 30, 2017

	Years of Formula Service							
Fiscal Year	**<10**	**10-15**	**16-20**	**21-25**	**26-30**	**>30 (FY 2000-2008) 31-35 (FY 2009)**	**>35**	**Total**
2008								
Avg. Monthly Benefit	$284	$917	$1,471	$1,943	$2,663	$3,474		$2,524
Final Average Salary	$23,542	$42,298	$52,288	$58,998	$62,353	$65,360		$56,822
Number of Retirees	252	147	150	216	237	1,107		2,109
2009								
Avg. Monthly Benefit	$295	$885	$1,319	$1,975	$2,670	$3,463	$3,859	$2,507
Final Average Salary	$25,301	$39,270	$50,616	$59,550	$63,268	$66,179	$69,949	$56,972
Number of Retirees	285	139	160	180	223	793	257	2,037
2010								
Avg. Monthly Benefit	$299	$919	$1,497	$1,911	$2,636	$3,447	$3,884	$2,441
Final Average Salary	$24,488	$43,105	$54,513	$60,302	$64,611	$67,443	$70,941	$57,729
Number of Retirees	326	162	205	224	276	733	323	2,249
2011								
Avg. Monthly Benefit	$318	$883	$1,458	$2,076	$2,777	$3,576	$3,941	$2,410
Final Average Salary	$24,106	$43,245	$56,574	$63,832	$68,358	$71,541	$73,031	$58,957
Number of Retirees	431	212	240	270	278	685	428	2,544
2012								
Avg. Monthly Benefit	$388	$935	$1,485	$2,011	$2,747	$3,592	$4,004	$2,301
Final Average Salary	$28,337	$44,368	$55,772	$63,085	$68,043	$70,400	$74,259	$58,233
Number of Retirees	518	254	253	337	345	668	371	2,746
2013								
Avg. Monthly Benefit	$349	$921	$1,431	$1,995	$2,772	$3,591	$4,063	$2,318
Final Average Salary	$26,267	$44,588	$55,793	$62,310	$69,357	$70,648	$73,864	$58,305
Number of Retirees	458	231	272	344	338	605	387	2,635
2014								
Avg. Monthly Benefit	$362	$991	$1,468	$2,127	$2,798	$3,578	$4,111	$2,287
Final Average Salary	$26,345	$46,119	$56,872	$67,321	$69,205	$73,092	$76,236	$58,990
Number of Retirees	496	224	264	300	329	589	349	2,551
2015								
Avg. Monthly Benefit	$361	$935	$1,493	$2,099	$2,748	$3,583	$4,162	$2,276
Final Average Salary	$26,624	$45,288	$58,477	$65,827	$70,081	$73,802	$76,641	$59,482
Number of Retirees	503	247	287	322	378	533	375	2,645
2016								
Avg. Monthly Benefit	$390	$980	$1,561	$2,147	$2,834	$3,699	$4,312	$2,357
Avg. Final Salary	$29,988	$46,588	$57,103	$66,988	$71,615	$76,136	$78,332	$61,320
Number of Retirees	478	234	276	368	358	501	365	2,580
2017								
Avg. Monthly Benefit	$344	$1,016	$1,583	$2,171	$3,028	$3,804	$4,459	$2,455
Final Average Salary	$38,355	$48,505	$61,936	$70,094	$75,721	$78,127	$81,997	$65,530
Number of Retirees	463	182	264	293	363	519	321	2,405

Schedule of TRA Benefit Recipients by Type

For Month of June 2017 – Payment Made June 1, 2017

Monthly Benefit Amount	Number of Recipients	Type of Retirement: Regular	Type of Retirement: Disability	Type of Retirement: Beneficiary
$ 0 – 1,000	15,545	14,027	148	1,370
$ 1,001 – 2,000	14,769	13,073	183	1,513
$ 2,001 – 3,000	16,977	15,555	140	1,282
$ 3,001 – 4,000	9,315	8,614	50	651
$ 4,001 – 5,000	4,164	3,802	14	348
$ 5,001 – 6,000	2,067	1,885	0	182
$ 6,001 – 7,000	950	839	0	111
$ 7,001 – 8,000	488	429	1	58
$ 8,001 – 9,000	247	220	0	27
$ 9,001 – 10,000	107	98	0	9
$ 10,001 – 11,000	52	46	0	6
$ 11,001 – 12,000	24	22	0	2
$ 12,001 – 13,000	14	12	0	2
$ 13,001 – 14,000	6	4	0	2
$ 14,001 – 15,000	1	1	0	0
$ 15,001 – 16,000	1	1	0	0
$ 16,001 and over	3	1	0	2
Totals:	64,730	58,629	536	5,565

TRA Membership Data

June 30, 2017

Distribution of Active Members*

Average Earnings in Dollars

Years of Service as of June 30, 2017**

Age	<3**	3-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40 +	Total
<25	2,577	57	2,634								
Avg. Earnings	29,088	44,767	29,428								
25-29	4,331	3,235	1,704	9,270							
Avg. Earnings	33,391	45,511	50,629	40,789							
30-34	2,323	1,879	5,043	1,379	10,624						
Avg. Earnings	33,294	46,833	53,710	63,792	49,338						
35-39	1,923	1,125	2,668	4,856	1,305	11,877					
Avg. Earnings	30,055	47,962	55,260	66,805	75,561	57,439					
40-44	1,505	746	1,494	2,119	4,385	873	11,122				
Avg. Earnings	26,763	48,012	54,595	65,958	75,753	81,151	62,978				
45-49	1,302	596	1,342	1,509	2,578	3,815	720	11,862			
Avg. Earnings	25,013	46,180	52,809	63,079	73,829	79,816	83,831	65,869			
50-54	959	417	951	1,124	1,433	2,060	2,492	588	10,024		
Avg. Earnings	22,365	43,119	50,607	63,209	72,280	77,501	81,958	83,075	67,330		
55-59	783	309	725	857	1,170	1,192	1,547	1,598	200	8,381	
Avg. Earnings	19,814	38,405	46,668	60,692	69,845	74,933	79,308	82,083	82,321	66,172	
60-64	589	180	413	421	648	703	654	349	352	68	4,377
Avg. Earnings	14,216	32,652	40,413	57,234	67,094	74,756	77,946	82,375	82,445	83,761	60,660
65-69	426	64	115	116	129	125	93	59	46	71	1,244
Avg. Earnings	8,064	19,747	30,419	58,187	60,245	71,392	79,349	87,694	87,159	83,180	43,498
70 +	203	38	40	25	15	14	18	11	9	23	396
Avg. Earnings	5,517	12,064	15,799	47,750	59,296	82,045	80,331	95,954	81,543	91,639	27,236
Total	16,921	8,646	14,495	12,406	11,663	8,782	5,524	2,605	607	162	81,811
Avg. Earnings	28,216	45,399	52,417	64,680	73,613	78,222	80,936	82,532	82,748	84,625	57,495

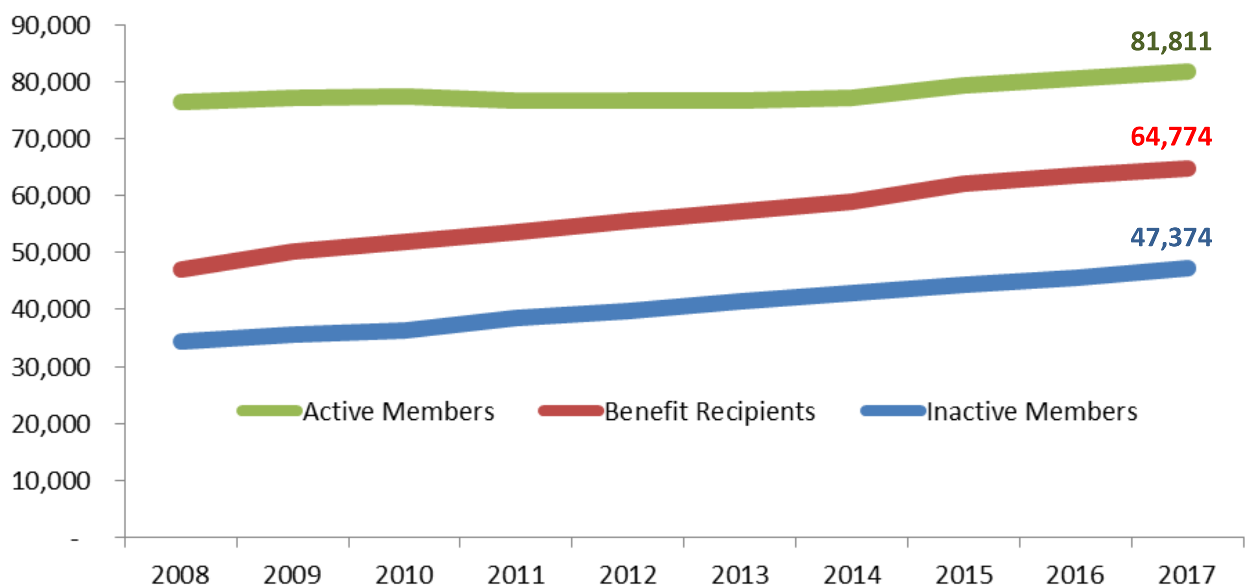
* *Active members include 3 Basic and 81,808 Coordinated members.*

** *This exhibit does not reflect service earned in Combined Service Annuity benefits. It should not be relied upon as an indicator of non-vested status.*

In each cell, the top number is the count of active members for the age/service combination and the bottom number is the amount of average annual earnings. Earnings shown in this exhibit are actual salaries earned during the fiscal year ending June 30, 2017, as reported by the Teachers Retirement Association of Minnesota.

10-Year Summary of TRA Membership

Year Ended June 30	Active Members	Inactive Members	Benefit Recipients
2008	76,515	34,283	46,981
2009	77,162	35,563	50,208
2010	77,356	36,407	51,853
2011	76,755	38,433	53,537
2012	76,649	39,792	55,425
2013	76,765	41,495	57,168
2014	77,243	42,891	58,809
2015	79,406	44,340	61,986
2016	80,530	45,530	63,503
2017	81,811	47,374	64,774



TRA Principal Participating Employers

Fiscal year ended June 30, 2017 and June 30, 2008

	2017			2008		
Employer Unit Name	**Covered Employees**	**Rank**	**Percentage of Active Membership**	**Covered Employees**	**Rank**	**Percentage of Active Membership**
Minneapolis – Special School District #1	4,609	1	5.62%	3,406	2	4.45
Anoka-Hennepin – ISD #11	3,220	2	3.92%	3,487	1	4.56
MnSCU (MN State Colleges & Universities)	2,869	3	3.50%	3,146	3	4.11
Rosemount-Apple Valley-Eagan – ISD #196	2,624	4	3.20%	2,679	4	3.50
Osseo – ISD #279	1,834	5	2.23%	1,923	5	2.52
South Washington County – ISD #833	1,769	6	2.16%	1,461	6	1.91
Rochester – ISD #535	1,748	7	2.13%	1,457	7	1.91
Robbinsdale – ISD #281	1,218	8	1.48%	1,181	8	1.54
Bloomington – ISD #271	1,075	9	1.31%	1,020	9	1.33
Mounds View – ISD #621	1,048	10	1.28%			
St. Cloud – ISD #742				967	10	1.26
All Other	60,069	–	73.18%	55,788		72.91
Total	82,083		100.00%	76,515		100.00%

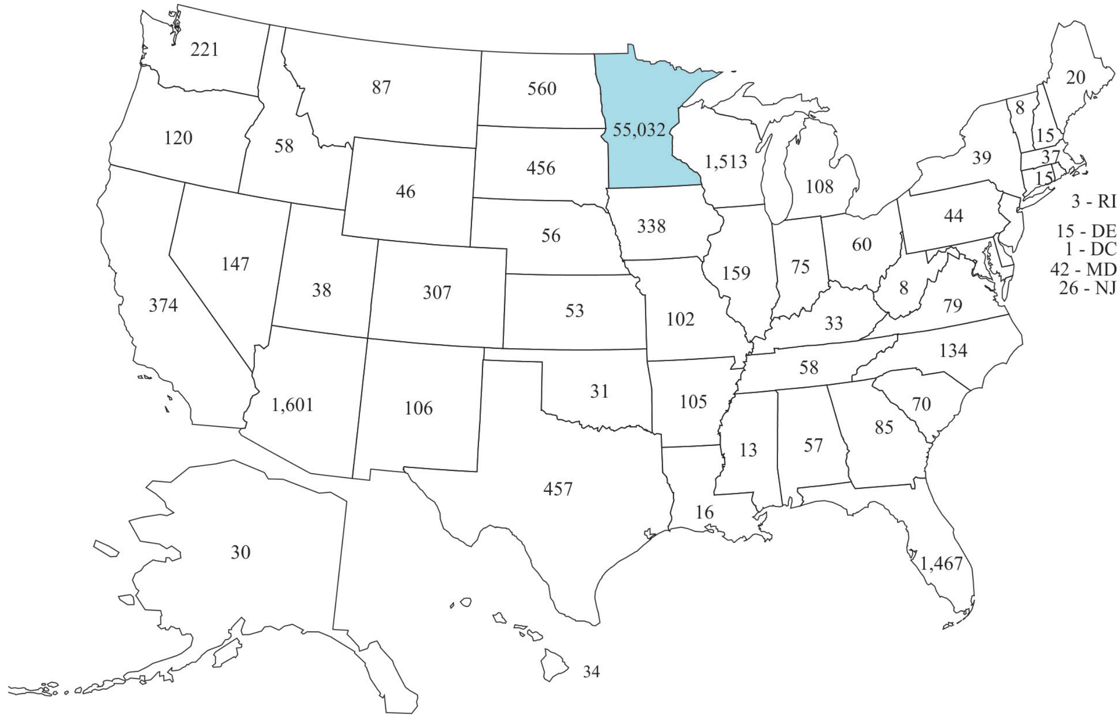
Number of TRA Employer Units

As of June 30, 2017

Year	Independent School Districts	Joint Power Units	MN State Colleges and Universities (MnSCU)	Charter Schools	State Agencies	Others	Total
2008	344	33	39	157	5	2	580
2009	347	34	39	156	5	2	583
2010	342	37	39	154	4	2	578
2011	342	37	39	155	4	2	579
2012	344	34	39	158	4	6	585
2013	347	35	39	160	4	6	591
2014	341	37	39	163	5	5	590
2015	373	0	39	167	5	5	589
2016	373	0	39	174	4	5	595
2017	373	0	39	173	4	4	593

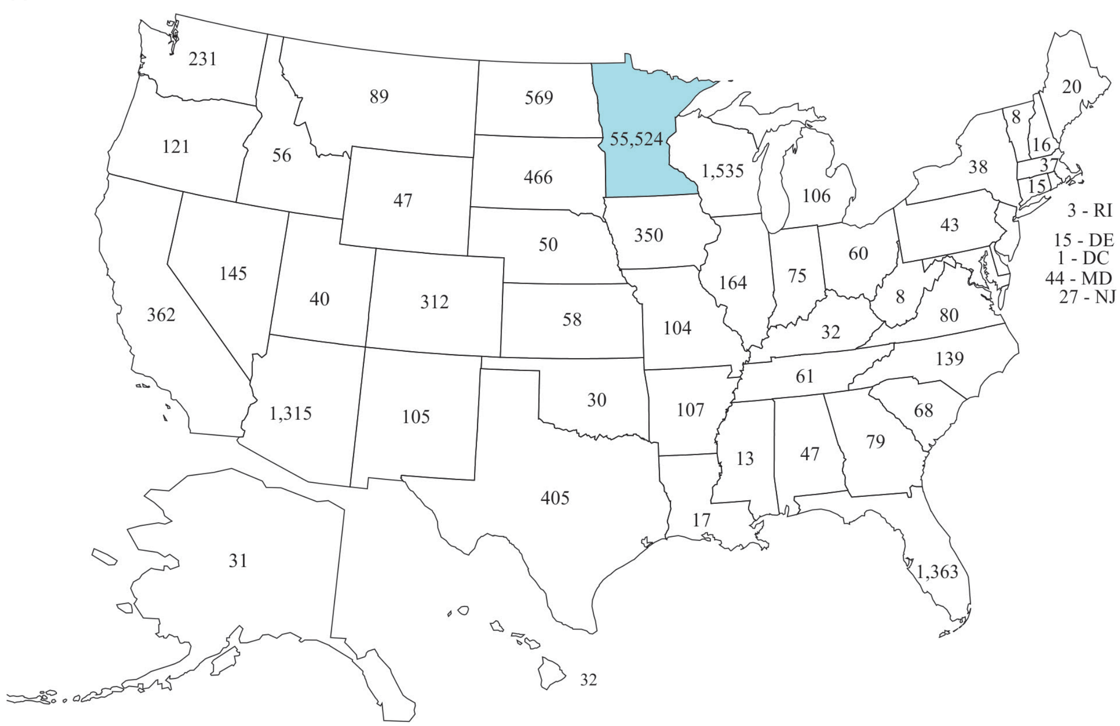
Distribution of TRA Benefits
Mailing Address of Benefit Recipient

February 1, 2017



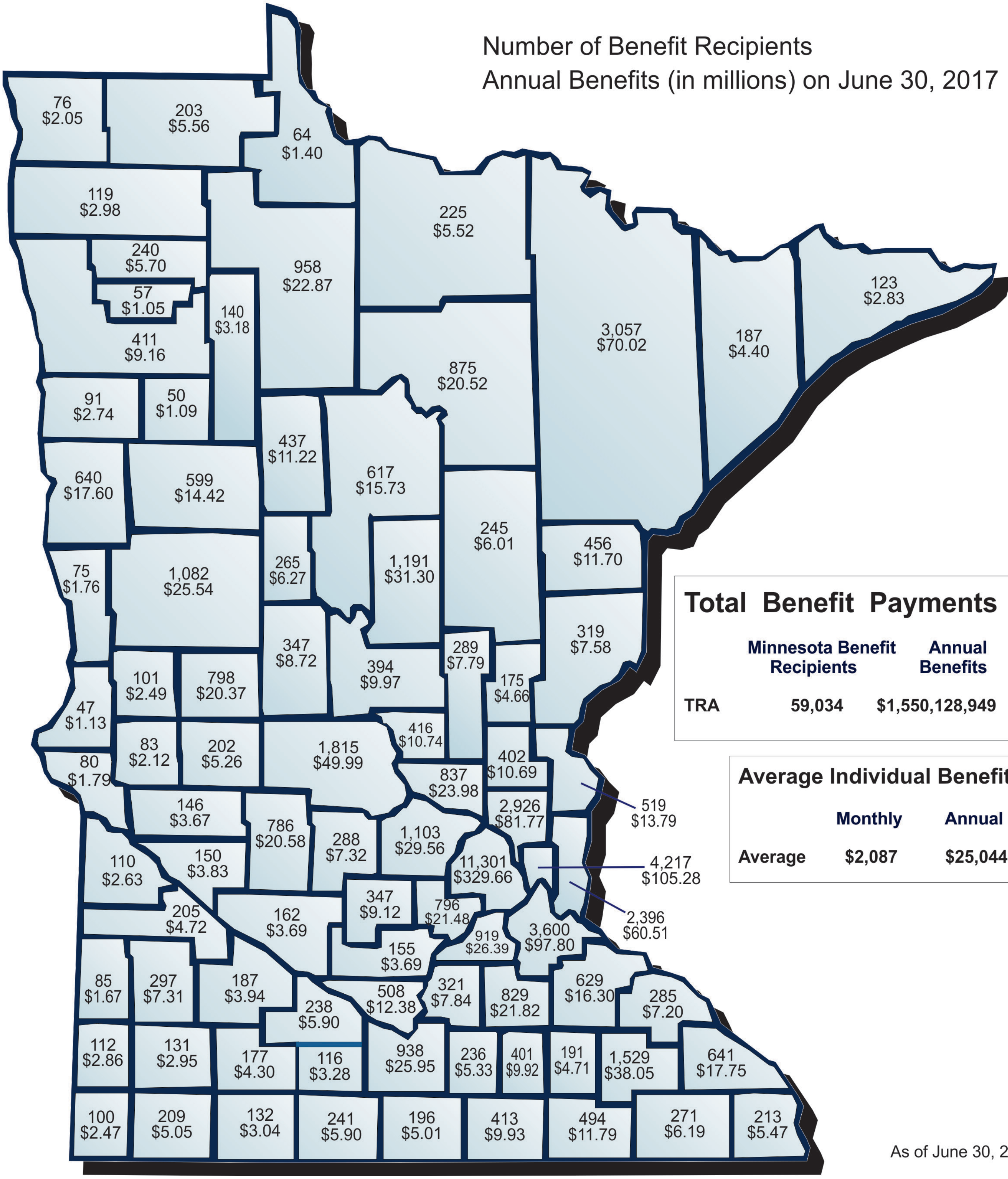
Total Recipients: 64,631
Note: 72 recipients reside outside the United States
Minnesota Recipients = 85.1 percent

June 1, 2017



Total Recipients: 64,730
Note: 67 recipients reside outside the United States
Minnesota Recipients = 85.8 percent

Annual Benefits for Minnesota TRA Benefit Recipients by County



Total Benefit Payments

	Minnesota Benefit Recipients	Annual Benefits
TRA	59,034	$1,550,128,949

Average Individual Benefit

	Monthly	Annual
Average	$2,087	$25,044

As of June 30, 2017

Annual Benefits and Recipients by County for the Teachers Retirement Association (TRA)

As of June 30, 2017

County	Members	Annual Benefit
Aitkin	245	$ 6,016,602
Anoka	2,926	$ 81,770,329
Becker	599	$ 14,423,735
Beltrami	958	$ 22,877,777
Benton	416	$ 10,741,949
Big Stone	80	$ 1,794,886
Blue Earth	938	$ 25,957,201
Brown	238	$ 5,903,984
Carlton	456	$ 11,703,717
Carver	796	$ 21,484,016
Cass	617	$ 15,739,923
Chippewa	150	$ 3,833,858
Chisago	519	$ 13,795,965
Clay	640	$ 17,604,730
Clearwater	140	$ 3,186,250
Cook	123	$ 2,832,576
Cottonwood	177	$ 4,305,566
Crow Wing	1,191	$ 31,304,055
Dakota	3,600	$ 97,809,750
Dodge	191	$ 4,715,926
Douglas	798	$ 20,376,946
Faribault	196	$ 5,012,628
Fillmore	271	$ 6,190,866
Freeborn	413	$ 9,937,562
Goodhue	629	$ 16,303,862
Grant	101	$ 2,498,911
Hennepin	11,301	$ 329,665,844
Houston	213	$ 5,470,456
Hubbard	437	$ 11,224,865
Isanti	402	$ 10,690,754
Itasca	875	$ 20,527,131
Jackson	132	$ 3,041,304
Kanabec	175	$ 4,665,007
Kandiyohi	786	$ 20,581,059
Kittson	76	$ 2,054,995
Koochiching	225	$ 5,522,897
Lac Qui Parle	110	$ 2,634,487
Lake	187	$ 4,408,540
Lake of the Woods	64	$ 1,405,243
Le Sueur	321	$ 7,843,269
Lincoln	85	$ 1,673,550
Lyon	297	$ 7,315,065
Mahnomen	50	$ 1,093,785
Marshall	119	$ 2,984,131
Martin	241	$ 5,904,028
McLeod	347	$ 9,120,286
Meeker	288	$ 7,329,614
Mille Lacs	289	$ 7,799,911
Morrison	394	$ 9,976,802
Mower	494	$ 11,796,933
Murray	131	$ 2,953,648
Nicollet	508	$ 12,382,534
Nobles	209	$ 5,050,384
Norman	91	$ 2,743,243
Olmsted	1,529	$ 38,057,482
Otter Tail	1,082	$ 25,544,253
Pennington	240	$ 5,701,461
Pine	319	$ 7,585,703
Pipestone	112	$ 2,865,109
Polk	411	$ 9,163,578
Pope	202	$ 5,266,616
Ramsey	4,217	$ 105,287,388
Red Lake	57	$ 1,055,509
Redwood	187	$ 3,941,645
Renville	162	$ 3,690,795
Rice	829	$ 21,826,109
Rock	100	$ 2,476,153
Roseau	203	$ 5,568,320
Saint Louis	3,057	$ 70,025,589
Scott	919	$ 26,395,484
Sherburne	837	$ 23,981,351
Sibley	155	$ 3,697,328
Stearns	1,815	$ 49,991,934
Steele	401	$ 9,926,328
Stevens	83	$ 2,122,948
Swift	146	$ 3,676,377
Todd	347	$ 8,723,320
Traverse	47	$ 1,137,320
Wabasha	285	$ 7,209,186
Wadena	265	$ 6,279,428
Waseca	236	$ 5,338,259
Washington	2,396	$ 60,513,043
Watonwan	116	$ 3,286,980
Wilkin	75	$ 1,767,023
Winona	641	$ 17,758,032
Wright	1,103	$ 29,562,870
Yellow Medicine	205	$ 4,722,697
Grand Total	**59,034**	**$ 1,550,128,949**

Projected TRA Benefit Payments

Fiscal Year Ended June 30, 2017

The table below shows estimated benefits expected to be paid over the next 25 years, based on the assumptions used in the valuation. The Active column shows benefits expected to be paid to members currently active on July 1, 2017. The Retirees column shows benefits expected to be paid to all other members. This includes those who, as of July 1, 2017, are receiving benefit payments or who terminated employment and are entitled to a deferred benefit.

(dollars in thousands)

Year Ending June 30	Active	Retirees	Total
2018	$ 36,162	$ 1,788,456	$1,824,618
2019	88,297	1,770,144	1,858,441
2020	140,250	1,757,203	1,897,453
2021	198,167	1,744,456	1,942,623
2022	258,885	1,731,505	1,990,390
2023	320,580	1,718,973	2,039,553
2024	382,238	1,705,408	2,087,646
2025	444,308	1,690,306	2,134,614
2026	509,117	1,673,448	2,182,565
2027	578,695	1,654,590	2,233,285
2028	654,437	1,633,205	2,287,642
2029	737,769	1,609,874	2,347,643
2030	830,269	1,582,782	2,413,051
2031	933,287	1,552,706	2,485,993
2032	1,047,200	1,519,323	2,566,523
2033	1,172,210	1,482,890	2,655,100
2034	1,306,934	1,443,427	2,750,361
2035	1,450,544	1,402,315	2,852,859
2036	1,602,629	1,357,569	2,960,198
2037	1,763,218	1,310,673	3,073,891
2038	1,930,163	1,260,141	3,190,304
2039	2,102,582	1,205,569	3,308,151
2040	2,282,101	1,149,063	3,431,164
2041	2,469,096	1,089,927	3,559,023
2042	2,661,768	1,029,044	3,690,812

Note: *Numbers may not add due to rounding.*

Cash flows are the expected future non-discounted payments to current members. These numbers exclude refund payouts to current nonvested inactives and assume future retirees and future terminated members make benefit elections according to valuation assumptions.

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Plan Statement

TRA Plan Statement

June 30, 2017

Purpose

The Minnesota Teachers Retirement Association (TRA) was established on July 1, 1931, by the state legislature. Its purpose is to improve educational service and better compensate teachers in order to make the occupation of teaching in Minnesota more attractive to qualified persons by providing a retirement benefit schedule that rewards faithful and continued service.

Administration

TRA is managed by eight trustees – three are statutorily appointed and five are elected. The statutory trustees are the Commissioner of Education, the Commissioner of the Minnesota Department of Management and Budget (MMB) and a representative of the Minnesota School Boards Association. Four of the five elected trustees are active members and one is a retiree. Administrative management of the fund is vested in an Executive Director who is appointed by the Board of Trustees. The Board also contracts with an actuary and uses legal counsel provided by the office of the Attorney General.

Membership

All teachers employed in public elementary and secondary schools, joint powers, charter schools and all other educational institutions maintained by the State of Minnesota (except those teachers employed by the city of St. Paul or by the University of Minnesota) are required to be members of TRA.

Teachers employed by Minnesota State Colleges and Universities (MnSCU) may elect TRA coverage within one year of their eligible employment. Newly-tenured MnSCU members also have a one-year period to elect TRA coverage. If electing TRA, the individual must pay for the past service covered by TRA, and the cost of past service is based on full actuarial cost. No Minnesota state college or university teacher is a member except for purposes of Social Security coverage if that teacher has coverage by the Defined Contribution Retirement Plan administered by the MnSCU Board.

Retirement Service Credit

Service credit earned for benefit determination is based on a teacher's earned salary relative to an annual base salary established for an employer unit. Minnesota statute defines the base salary for each employer as the lowest salary paid to a full-time Bachelor of Arts (BA) base contract in the previous fiscal year. For example, a school district's annual base salary is determined to be $40,000. A teacher with an earned salary of $30,000 for that year will earn 0.75 year of service credit.

Service credit for MnSCU members is based on a full-time equivalence method.

No more than one year of service credit may be earned by any member during a fiscal year, and no more than 0.111 per year may be earned during any one month.

Financing

Benefits are financed by employee contributions, employer contributions, investment earnings and turnover gains. Turnover gains are employer contributions retained by the fund when members take refunds of their employee contributions.

Vesting

In a pension plan, vesting means a member has earned sufficient service credit to be eligible for a monthly benefit.

TRA members who have performed covered service after May 15, 1989, are vested after three years of teaching service. TRA members who last worked prior to May 16, 1989, require five years or, in some cases, ten years of service credit earned in order to be eligible for a monthly annuity benefit.

Employee Contributions

TRA members pay a percentage of their gross annual salary as determined by their membership plan. Basic Plan members (without Social Security coverage) contribute 11.5 percent of their annual salary, while Coordinated Plan members (coordinated with Social Security coverage) contribute 7.5 percent of their annual salary.

Employer Contributions

Local school districts and other TRA-covered employer units provide contributions of 11.5 percent of total salary for members in the Basic Plan and 7.5 percent of total salary for members in the Coordinated Plan. For Coordinated Plan members the employer unit also makes the required matching contribution to the Social Security Administration.

Minneapolis Special School District #1 pays an employer additional contribution of 3.64 percent of annual salary for TRA members employed by that school district.

TRA also receives approximately $35 million annually in state and local direct aid. The aid payments are designed to offset unfunded liabilities assumed with the 2006 merger of the Minneapolis Teachers Retirement Fund Association (MTRFA) and the 2015 merger of the Duluth Teachers Retirement Fund Association (DTRFA).

Retirement Benefit

The retirement benefit is determined by a formula based on the member's average salary earned on the highest five successive years of formula service credit, an accumulated percentage factor based on the total years of service credit, and the member's age at retirement. The retirement benefits for members who were first hired before July 1, 1989, are different from the retirement benefits for members who were first hired after June 30, 1989.

Coordinated Members First Hired *Before* July 1, 1989

For members first hired before July 1, 1989, the retirement benefits (with average salary defined as the average of the highest five successive annual salaries) are the greater of:

The sum of:

- 1.20 percent of average salary for the first 10 years of allowable service;
- 1.70 percent of average salary for each subsequent year prior to July 1, 2006; and
- 1.90 percent of average salary for each year of allowable service July 1, 2006 and after.
- No actuarial reduction if age plus years of service totals 90. Otherwise, reduction of 0.25 percent for each month the member is under age 65 (or age 62 if 30 years of allowable service) at the time of retirement.

or

The sum of:

- 1.70 percent of average salary for each year of allowable service prior to July 1, 2006; and
- 1.90 percent of average salary for each year of allowable service beginning July 1, 2006.
- Actuarial reduction (averaging 4.0 percent to 5.5 percent per year) applies if the member is under full Social Security benefit retirement age, but not to exceed age 65.

or

- For certain eligible members first hired prior to July 1, 1969, a money purchase annuity equal to the actuarial equivalent of 220.00 percent of the member's accumulated deductions plus interest thereon.

Effective July 1, 2015, the actuarial reduction factors for retirement before Normal Retirement Age will be modified for members first hired prior to July 1, 1989. The actuarial reductions will be based on a statutory definition rather than actuarial equivalence factors. The factors will be phased-in over a five-year period ending June 30, 2020.

Members who reach age 62 with 30 years of service are eligible for a special group of reduction factors. The following example illustrates how these special reduction factors will be applied to an eligible person of the normal retirement age of 65:

Age 62	10.40%
Age 63	6.64%
Age 64	3.18%
Age 65	0.00%

Members who do not reach age 62 with 30 years of service credit are eligible for a different group of factors. The following example illustrates how these reduction factors will be applied to an eligible person of the normal retirement age of 65:

Age 55	43.56%	Age 61	18.96%
Age 56	39.98%	Age 62	13.68%
Age 57	36.66%	Age 63	8.76%
Age 58	33.59%	Age 64	4.21%
Age 59	30.75%	Age 65	0.00%
Age 60	24.65%		

Coordinated Members First Hired *After* June 30, 1989

For members first hired after June 30, 1989, the retirement benefits (with average salary defined as the average of the highest five successive annual salaries) are the sum of:

- 1.70 percent of average salary for each year of allowable service prior to July 1, 2006; and
- 1.90 percent of average salary for each year of allowable service beginning July 1, 2006.

Effective July 1, 2015, the actuarial reduction factors for retirement before Normal Retirement Age will be modified. The actuarial reduction will be based on a statutory definition rather than actuarial equivalence factors. The factors will be phased-in over a five-year period ending June 30, 2020.

Reduction factors for members of the normal retirement age of 66 first hired from July 1, 1989 through June 30, 2006, or who reach age 62 with 30 years of service credit:

Age 62	14.46%
Age 63	10.40%
Age 64	6.64%
Age 65	3.18%
Age 66	0.00%

Reduction factors for members of the normal retirement age of 66 first hired from July 1, 1989 through June 30, 2006, or who do not reach age 62 with 30 years of service credit:

Age 55	51.55%	Age 61	24.65%
Age 56	47.59%	Age 62	18.96%
Age 57	43.90%	Age 63	13.68%
Age 58	40.46%	Age 64	8.76%
Age 59	37.28%	Age 65	4.21%
Age 60	30.75%	Age 66	0.00%

Reduction factors for members of the normal retirement age of 66 first hired on or after July 1, 2006, or who reach age 62 with 30 years of service credit:

Age 62	16.11%
Age 63	11.70%
Age 64	7.55%
Age 65	3.65%
Age 66	0.00%

Reduction factors for members of the normal retirement age of 66 first hired on or after July 1, 2006, or who do not reach age 62 with 30 years of service credit:

Age 55	54.08%	Age 61	26.46%
Age 56	50.08%	Age 62	20.53%
Age 57	46.30%	Age 63	14.93%
Age 58	42.74%	Age 64	9.65%
Age 59	39.38%	Age 65	4.68%
Age 60	32.74%	Age 66	0.00%

Basic Members (Former MTRFA)

TRA has 16 active and inactive Basic members from the former Minneapolis Teachers Retirement Fund Association (MTRFA) who were transferred to TRA effective June 30, 2006. Under the merger legislation, this group of former MTRFA members retains eligibility for the benefit provisions as provided by the MTRFA Articles of Incorporation and by-laws as they existed on June 30, 2006.

The retirement benefits for these members (with average salary defined as the average of the highest five successive annual salaries) are:

- 2.50 percent of average salary for each year of teaching service.
- No actuarial reduction applies if the retiring member is age 60 or any age with 30 years of teaching service.

If the member is age 55 with less than 30 years of teaching service, the retirement benefit is the greater of:

a. 2.25 percent of average salary for each year of teaching service with reduction of 0.25 percent for each month the member is under the age first eligible for a normal retirement benefit.

or

b. 2.50 percent of average salary for each year of teaching service assuming augmentation to the age first eligible for a normal retirement benefit at 3.00 percent per year, and actuarial reduction for each month the member is under the age first eligible for a normal retirement benefit.

An alternative benefit is available to members who are at least age 50 and have seven years of teaching service. The benefit is based on the accumulation of the 6.50 percent "city deposits" to the retirement fund. Other benefits are also provided under this alternative benefit, depending on the member's age and teaching service.

Basic Members (Non-MTRFA)

As of June 30, 2017, TRA had six inactive members who retain eligibility for the Basic Plan and who do not have eligibility for the provisions for former MTRFA Basic members. The retirement benefits (with average salary defined as the average of the highest five successive annual salaries) are the greater of:

a. 2.20 percent of average salary for each of the first ten years of allowable service and 2.70 percent of average salary for each subsequent year with reduction of 0.25 percent for each month the member is under age 65 at time of retirement, or under age 62 if 30 years of allowable service. No reduction if age plus years of allowable service totals 90.

b. 2.70 percent of average salary for each year of allowable service assuming augmentation to age 65 at 3.00 percent per year, and actuarial reduction for each month the member is under age 65.

or

c. For eligible members, a money purchase annuity equal to the actuarial equivalent of 220.00 percent of the member's accumulated deductions plus interest thereon

All members in this group have reached normal retirement age and are no longer subject to early retirement penalties.

Deferred Retirement

Members with three or more years of allowable service (ten or more years of allowable service if termination of teaching service occurs before July 1, 1987, and five or more years of allowable service if termination of teaching service occurs after June 30, 1987, but before May 16, 1989) who terminate teaching service in schools covered by the association may have their retirement benefit deferred until they attain age 55 or older.

Members who defer their benefits will receive a deferral increase as follows:

Members hired prior to July 1, 2006	Prior to July 1, 2012: 3.0 percent annually through December 31 of the year in which the member would have reached 55 and 5.0 percent annually thereafter each year the benefit is deferred After July 1, 2012: 2.0 percent
Members hired on or after July 1, 2006	Prior to July 1, 2012: 2.5 percent After July 1, 2012: 2.0 percent

The deferral period must be at least three months. If on a leave of absence, the member is not eligible for the deferral increase on a deferred annuity for any portion of time on leave.

Annuity Plan Options

Six different annuity plan options are available to TRA members that provide monthly benefit payments for as long as the annuitant lives. The No Refund Plan provides the highest possible monthly benefit, but terminates upon the member's death. A member may choose to provide survivor benefits to a designated beneficiary(ies) by selecting one of the five plans that have survivorship features.

A married member must choose one of the three survivorship plans (plans 4 through 6) listed below at retirement, unless the member's spouse waives the right to this type of annuity.

1. No Refund, For Life of Member
2. Guaranteed Refund
3. 15-Years Guaranteed
4. 100% Survivorship with Bounceback
5. 50% Survivorship with Bounceback
6. 75% Survivorship with Bounceback

Annual Post-Retirement Increases

Once retired, each January, if specified by law, a post-retirement increase may be made to a member's monthly benefit.

Under current Minnesota statute, the annual post-retirement increase is 2.0 percent. Once the TRA Fund reaches a market value funding ratio of 90 percent for two consecutive years, the annual post-retirement increase would be increased to 2.5 percent.

On January 1,

- a benefit recipient who has been receiving an annuity or benefit for at least 12 full months as of June 30 of the calendar year before the adjustment will receive a post-retirement increase of 2.0 percent.
- a benefit recipient who has been receiving an annuity or benefit for at least one full month, but less than 12 months as of June 30 of the calendar year before the adjustment will receive a prorated post-retirement increase.

Combined Service Annuity

Any vested member having combined service credit with any two or more Minnesota public retirement funds that participates in the combined service annuity program, may elect to receive a combined service annuity upon compliance with eligibility requirements for retirement.

Refunds

Upon termination of teaching service and application, TRA will issue a refund of a member's accumulated contributions plus 5 percent interest compounded annually if termination occurred before May 16, 1989, and 6 percent interest compounded annually if termination occurred on or after May 16, 1989. Since July 1, 2011, all account balances accrue interest at a rate of 4 percent annually, regardless of date of termination.

A refund will be issued only if the member has officially resigned from employment and the official refund application form is submitted no sooner than 30 days after termination of teaching service.

Repayment of Refunds

Members who return to teaching service after previously withdrawing their contributions may repay these contributions upon completing two years of allowable service. The repayment must include interest of 8.5 percent, compounded annually from the date of the refund. If a member has more than two years of refunded service, they may repay a minimum portion, which is at least 1/3 of the total service credit period for all refunds previously taken.

Disability Benefits

An active member who becomes disabled after at least three years of allowable service is eligible to apply for a total and permanent disability benefit provided at least two of the required three years of allowable service are performed after last becoming a member. State statute defines total and permanent disability as the inability to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment that can be expected to be of a long, continued and indefinite duration. An indefinite duration is a period of at least one year.

Survivor Benefits of Members Prior to Retirement

Certain benefits are available to the survivor(s) of members who die before officially retiring with TRA. Beneficiary designation options vary for single members and married members.

Single Members

Non-Vested

- A lump-sum death benefit equal to a member's accumulated deductions plus interest to the date of death is payable to either the designated beneficiary or estate, whichever is applicable. Interest is compounded annually at 4 percent. Contributions made by the employer are not included in this benefit. A member may designate any person(s), trust, or organization(s) as a beneficiary.

Vested

- For a member without a surviving spouse at the time of death, survivor benefits will *automatically* be paid for a period certain to all dependent children under the age of 20, *unless* the member has chosen the lifetime monthly benefit option explained in the next paragraph. These payments are made from the date of death to the date each dependent child attains age 20 if the child is under age 15 on the date of death. If the dependent child is 15 years or older on the date of death, payments will be made for five years. Payments for children under the age of 18 would be made to a custodial parent or court-appointed guardian. A dependent child is a biological or adopted child who is under 20 years of age and who is dependent on the member for more than one-half of his or her financial support.

- A member may designate payment of lifetime monthly benefits for either former spouse(s), or dependent and non-dependent, biological or adopted child(ren), instead of the above described surviving dependent child(ren) benefits being paid.
- For a member without a former spouse or dependent child(ren) at the time of death, either the designated beneficiary or estate, whichever is applicable, is entitled to a lump-sum death benefit equal to accumulated deductions plus interest to the date of death. Interest on account balances is compounded annually at 4 percent. Contributions made by the employer are not included in this benefit. A member may designate any person(s), trust, or organization(s) as a beneficiary.

Married Members

A surviving spouse has precedence over any designated beneficiary.

Non-Vested

- A member's spouse is entitled to a lump-sum death benefit equal to the accumulated deductions plus interest to the date of death. Interest on account balances is compounded annually at 4 percent. Contributions made by the employer are not included in this benefit.

Vested

- A member's surviving spouse may elect to receive a lifetime annuity in lieu of a lump-sum benefit. The lifetime annuity is payable on a monthly basis for the lifetime of the spouse. Payments terminate upon the death of the spouse with no benefits remaining for other beneficiaries.
- Instead of a lifetime annuity, a member's spouse may elect to receive actuarially equivalent payments for a term certain annuity of 5, 10, 15 or 20 years. The amount of the annuity is based upon a formula, the member's age at the time of death and the age of the spouse when benefits begin to accrue, although monthly benefit payments cannot exceed 75 percent of the member's average High-5 monthly salary.
- A member and their spouse may *jointly* make a specification to waive the spouse's benefits so that designated beneficiary(ies) will receive a lifetime survivor annuity benefit. The designated beneficiary may be ***either*** the member's former spouse(s) ***or*** the member's biological or adopted child(ren). Under a joint specification, a designated beneficiary cannot elect a term certain annuity of 5, 10, 15 or 20 years. If a joint specification is not on file, the annuity is payable only to the surviving spouse.

Non-Vested or Vested

- A member and their spouse may *jointly* make a specification to waive the spouse's benefits so that any person, trust or organization will receive a lump-sum death benefit equal to the accumulated deductions plus interest to the date of death.

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Teachers Retirement Association

60 Empire Drive, Suite 400

Saint Paul, Minnesota 55103-4000

651.296.2409

800.657.3669

800.627.3529 TTY