

**DALHOUSIE UNIVERSITY
STAFF PENSION PLAN
REPORT ON THE ACTUARIAL VALUATION
AS AT MARCH 31, 2019**

(REGISTRATION No. C242297)

OCTOBER 2019

**PREPARED BY:
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SUMMARY OF RESULTS

All Figures in (\$000's)	
Going Concern Financial Position	March 31, 2019
Going concern value of assets	\$1,389,267
Going concern actuarial liabilities	(1,395,709)
Going concern excess / (unfunded actuarial liabilities)	(\$6,442)

Solvency Financial Position	March 31, 2019
Solvency assets	\$1,388,067
Solvency liabilities	(1,704,795)
Solvency excess / (deficiency) excluding present value of special payments	(\$316,728)
Present value of special payments	\$4,282
Solvency excess / (deficiency)	(\$312,446)
Transfer ratio	81.5%

Wind-up Financial Position	March 31, 2019
Wind-up assets	\$1,388,067
Total wind-up liabilities	(1,704,795)
Wind-up surplus / (deficiency)	(\$316,728)

Funding Requirements (annualized)	March 31, 2019	
	% of Payroll	\$
Estimated pensionable earnings		262,242
Total annual current service cost	17.32%	45,428
Employee regular contributions	6.06%	15,900
Employee supplementary contributions	2.00%	5,245
Employer matching regular contributions	6.06%	15,900
Balance of cost = employer "overmatching contribution"	3.20%	8,383
Employer contributions as a percentage of employee contributions	114.89%	
Minimum special payments in 2019/20 towards amortization of unfunded actuarial liabilities		\$918
Total employer contributions in year following valuation		\$25,201
Maximum contribution		\$341,011

SECTION I INTRODUCTION AND PURPOSE OF VALUATION

At the request of Dalhousie University, we have completed an actuarial valuation of the *Dalhousie University Staff Pension Plan* (the “Plan”) as of March 31, 2019. The last actuarial valuation was performed as at March 31, 2018.

The purposes of this actuarial valuation are as follows:

- to determine the financial position of the Plan on going concern, solvency, and hypothetical wind-up bases;
- to establish the minimum and maximum contributions to the Plan until the next valuation; and
- to meet the statutory filing requirements under the Nova Scotia *Pension Benefits Act* and the *Income Tax Act* (Canada).

In this report, we have first provided the valuation results, along with an actuarial opinion with recommended funding levels for use until the next valuation. The data, actuarial assumptions and methodology used in valuing both the assets and the actuarial liabilities are provided by way of appendices for ease of reference.

The intended users of this report are Dalhousie University, the Nova Scotia Superintendent of Pensions and the Canada Revenue Agency. This report is not intended or necessarily suitable for purposes other than those listed above. Any party reviewing this report for other purposes should have their own actuary or other qualified professional assist in their review to ensure that the party understands the assumptions, results and uncertainties inherent in our estimates.

The next valuation of the Plan must be completed as at a date no later than March 31, 2020.

Reliance

We have relied on the asset information in the financial statements provided by Dalhousie University. We have also relied on the Plan sponsor to provide all relevant data and to confirm the pertinent Plan terms.

SECTION II PLAN CHANGES AND SUBSEQUENT EVENTS

This pension plan is a “best average salary” defined benefit plan. This means that each Member’s retirement pension is calculated as a specified percentage (2% in this case) of his or her average salary during the best three years of membership in the Plan.

The previous valuation was prepared as at March 31, 2018. There have been no amendments or changes to the Plan between the last actuarial valuation and this valuation effective March 31, 2019.

A detailed description of the current provisions of the Plan is contained in Appendix E, at the end of this report.

Actuarial Assumptions

There have been no changes to the going concern assumptions since the last valuation.

The solvency assumptions have been changed to reflect market conditions at the valuation date.

The actuarial assumptions used in the valuation are provided in Appendix B.

We are not aware of any events subsequent to the valuation date that would have a material impact on the results of this valuation.

SECTION III FINANCIAL POSITION OF THE PLAN

A. Going Concern Basis: Financial Position as at March 31, 2019

The tables below set out the going concern valuation balance sheet as of March 31, 2019 for the Pension Trust Fund (PTF), the Retirees Trust Fund (RTF), and the Plan as a whole, respectively. The results as at March 31, 2018 are also shown for comparative purposes.

PENSION TRUST FUND - GOING CONCERN ACTUARIAL BALANCE SHEET (ALL FIGURES IN \$000'S)

	March 31, 2018	March 31, 2019
Going concern assets		
Market value of assets	\$713,760	\$737,213
Financial statement (payables) / receivables	(8,423)	(9,599)
Total going concern assets	\$705,337	\$727,614
Going concern actuarial liabilities		
Active members	\$700,172	\$709,977
Additional voluntary contributions	341	395
Deferred pensioners and pending transfers	49,148	53,807
Termination solvency holdbacks	492	429
Total going concern actuarial liabilities	\$750,153	\$764,608
Going concern excess / (unfunded actuarial liability)	(\$44,816)	(\$36,994)

RETIREES TRUST FUND - GOING CONCERN ACTUARIAL BALANCE SHEET
(ALL FIGURES IN \$000'S)

	March 31, 2018	March 31, 2019
Going concern assets		
Market value of assets	\$598,141	\$658,106
Financial statement (payables) / receivables	5,009	3,547
Total going concern assets	\$603,150	\$661,653
Going concern actuarial liabilities		
Pensioners and beneficiaries	\$560,200	\$613,153
Deferred members	17,684	17,948
Total going concern actuarial liabilities	\$577,884	\$631,101
Going concern excess / (unfunded actuarial liability)	\$25,266	\$30,552

TOTAL PLAN - GOING CONCERN ACTUARIAL BALANCE SHEET
(ALL FIGURES IN \$000'S)

	March 31, 2018	March 31, 2019
Going concern assets		
Market value of PTF assets*	\$705,337	\$727,614
Market value of RTF assets*	603,150	661,653
Total going concern assets	\$1,308,487	\$1,389,267
Going concern actuarial liabilities		
PTF actuarial liabilities	\$750,153	\$764,608
RTF actuarial liabilities	577,884	631,101
Total going concern actuarial liabilities	\$1,328,037	\$1,395,709
Going concern excess / (unfunded actuarial liability)	(\$19,550)	(\$6,442)

* Net of (Payables)/Receivables

As shown above, the March 31, 2019 actuarial valuation has revealed an unfunded actuarial liability in the amount of \$6,442,000. This compares to a going concern unfunded actuarial liability at the previous valuation of \$19,550,000. Funding requirements in respect of the unfunded actuarial liability are detailed in Section IV – Funding Requirements.

Sensitivity Analysis

Below we show the impact on the going concern actuarial liability as at March 31, 2019 of a one percentage point drop in the discount rate assumption (i.e., from 6.00% per annum to 5.00% per annum in the pre-retirement period, and from 4.55% per annum to 3.55% per annum in the post-retirement period). All other assumptions were kept unchanged.

GOING CONCERN SENSITIVITY (FIGURES IN \$000'S)

	Impact of 1% Drop
Total Going Concern Actuarial Liability	\$1,594,634,000

A 1% decline in the discount rate would increase the going concern actuarial liability by \$198,925,000 or 14.3%. There would be a corresponding dollar increase in the unfunded liability.

Reconciliation of Going Concern Financial Position

The reconciliation provides an independent cross-check of the calculations performed, and also determines the chief reasons leading to the changes in the going concern financial position that have occurred since the previous valuation date.

Although a complete analysis down to the final dollar can be made, such an analysis requires the processing of a considerable amount of detailed data relating to the Plan, the expense of which would not normally be justified unless there were special circumstances. However, it is possible to make an approximate analysis along broader lines and under normal circumstances, this type of analysis will produce meaningful results.

The table below summarizes the results of our reconciliation of change in financial position over the period under consideration.

ANALYSIS OF SOURCES OF GAIN AND LOSS BETWEEN MARCH 31, 2018 AND MARCH 31, 2019 (GOING CONCERN VALUATION)

	PTF	RTF	Total
Going concern excess / (unfunded liability) at March 31, 2018	(44,816)	25,266	(19,550)
Interest on market value surplus / (deficit)	(2,689)	1,152	(1,537)
Investment income greater / (less) than expected	11,646	13,452	25,098
Special payments plus interest	2,852	0	2,852
Salary increases (greater) / less than expected	2,844	0	2,844
Change in maximum pension more than expected	(9)	0	(9)
Retirement, termination, active death experience	(4,221)	0	(4,221)
Change in prescribed interest rates for pending terminations	(1,345)	0	(1,345)
Cost of indexing	0	(6,543)	(6,543)
Pensioner mortality experience	0	(2,605)	(2,605)
Miscellaneous experience gains / (losses) ¹	(1,256)	(170)	(1,426)
Going concern excess / (unfunded liability) at March 31, 2019	(36,994)	30,552	(6,442)

¹ Miscellaneous experience includes all items not specifically traced, and imprecision imposed by valuation and measurement methodologies in some of the items that are traced. Included are experience gains and losses associated with the basis implicit in PTF to RTF transfers (e.g., assumed versus actual proportion of married members among new retirees), data refinements, and the interplay among assumptions in dealing with actual versus expected results.

B. Solvency Basis: Financial Position as at March 31, 2019

The tables below set out the solvency valuation balance sheet as of March 31, 2019 for the Pension Trust Fund (PTF), the Retirees Trust Fund (RTF), and the Plan as a whole, respectively. The results as at March 31, 2018 are also shown for comparative purposes.

PENSION TRUST FUND – SOLVENCY BALANCE SHEET (ALL FIGURES IN \$000'S)

	March 31, 2018	March 31, 2019
Solvency assets		
Market value of assets	\$713,760	\$737,213
Financial statement (payables) / receivables	(8,423)	(9,599)
Estimated wind-up expenses	(1,200)	(1,200)
Total solvency assets	\$704,137	\$726,414
Solvency liabilities		
Active members	\$890,598	\$921,556
Additional voluntary contributions	341	395
Deferred Pensioners and Pending transfers	49,148	53,807
Termination solvency holdbacks	492	429
Total solvency liabilities	\$940,579	\$976,187
Solvency excess / (deficiency)	(\$236,442)	(\$249,773)

RETIREES TRUST FUND – SOLVENCY BALANCE SHEET
(ALL FIGURES IN \$000'S)

	March 31, 2018	March 31, 2019
Solvency assets		
Market value of assets	\$598,141	\$658,106
Financial statement (payables) / receivables	5,009	3,547
Total solvency assets	<u>\$603,150</u>	<u>\$661,653</u>
Solvency liabilities		
Pensioners and beneficiaries	\$643,330	\$709,588
Deferred members	18,783	19,020
Total solvency liabilities	<u>\$662,113</u>	<u>\$728,608</u>
Solvency excess / (deficiency)	(\$58,963)	(\$66,955)

TOTAL PLAN – SOLVENCY BALANCE SHEET
(ALL FIGURES IN \$000'S)

	March 31, 2018	March 31, 2019
Solvency assets		
Market value of PTF assets*	\$705,337	\$727,614
Estimated wind-up expenses	(1,200)	(1,200)
Market value of RTF assets*	603,150	661,653
Total solvency assets	<u>\$1,307,287</u>	<u>\$1,388,067</u>
Solvency liabilities		
PTF solvency liabilities	\$940,579	\$976,187
RTF solvency liabilities	662,113	728,608
Total solvency liabilities	<u>\$1,602,692</u>	<u>\$1,704,795</u>
Solvency excess / (deficiency) excluding present value of special payments	(\$295,405)	(\$316,728)
Present value of 5 years' worth of unfunded liability special payments (i.e., the solvency asset adjustment)	12,861	4,282
Solvency excess / (deficiency)	(\$282,544)	(\$312,446)

* Net of (payables) / receivables

As shown above, the solvency valuation has revealed a solvency deficiency of \$316,728,000, prior to the inclusion of the present value of any special payments as at March 31, 2019. With the inclusion of 5 years' worth of special payments, there is a solvency deficiency of \$312,446,000.

Sensitivity Analysis

Below we show the impact on the solvency liability as at March 31, 2019 of a one percentage point drop in the discount rate assumption. All other assumptions were kept unchanged.

SOLVENCY SENSITIVITY (FIGURES IN \$000'S)

	Impact of 1% Drop
Total Solvency Actuarial Liability	\$1,961,715,000

A 1% decline in the solvency discount rate would increase the solvency liability by \$256,920,000 or 15.1%. There would be a corresponding dollar increase in the solvency deficiency.

Incremental Cost

The incremental cost is the present value, at the valuation date, of the expected aggregate change in the hypothetical wind-up or solvency liability between the valuation date and the next valuation date. It also reflects expected benefit payments between the valuation date and the next calculation date.

In our report, we have determined the incremental cost on a solvency basis. The incremental cost was determined as the sum of (a) and (b) minus (c):

- (a) the projected solvency liability at the next valuation date for those members at the current valuation date, allowing for expected decrements, change in membership status and service accrual between the current valuation date and the next valuation date. No adjustment was made for new entrants between the two valuation dates. The resulting projected solvency liability was then discounted to the current valuation date;
- (b) the present value of the benefit payments expected to be paid between current valuation date and the next valuation date, discounted to the current valuation date; and
- (c) the solvency liability as at the current valuation date.

For purposes of calculating the solvency incremental cost, the expected decrements, as well as the expected benefit payments between the current valuation date and the next valuation date, were determined using the going concern demographic assumptions. The projected solvency liability at the next valuation date was determined using the same methods and assumptions as disclosed in Appendix B of this report. In particular, we have assumed that the discount rates will remain the same throughout the projection period and the Standards of Practice for determining Pension Commuted Values in effect at the valuation date will remain unchanged, as will the current educational guidance on the estimation of annuity purchase costs.

The estimated incremental cost from March 31, 2019 to March 31, 2020 is \$78,793,000. The estimated incremental cost does not impact the funding requirements of the Plan under the Nova Scotia *Pension Benefits Act* and is for information purposes only.

C. Transfer Ratio as at March 31, 2019

The Regulations under the Nova Scotia *Pension Benefits Act* require the determination of a “transfer ratio”. This transfer ratio is used to determine whether transfers of commuted values to terminating members can be made in full, immediately. The transfer ratio is the ratio of:

- (i) the solvency assets (at market value), minus the lesser of the previous year credit balance and the sum of the minimum employer contributions required under the Regulations until the next valuation date (\$1,389,267,000 – \$0), to
- (ii) the sum of the solvency liabilities and the liabilities for benefits that were excluded in calculating the solvency liabilities (note that there were no such benefits excluded for the solvency valuation).

As at March 31, 2019 the transfer ratio was 81.5% (i.e., \$1,389,267,000 divided by \$1,704,795,000).

If the transfer ratio is less than 100% then, unless certain conditions are met, a portion of a terminated member's commuted value cannot be paid in a lump sum, but instead must be held back and paid with interest within 5 years. For this plan, the portion is 18.5%. The conditions that allow full payment of the commuted value are:

- if an additional contribution is remitted to the fund equal to the portion of the commuted value that should be held back; or
- if the aggregate of transfer deficiencies for all transfers made since the last review date does not exceed 5% of the assets of the plan at that time.

Next Valuation Date

A valuation indicates “solvency concerns” if the ratio of solvency assets to solvency liabilities is less than 0.85. If a pension plan has solvency concerns, the next valuation of the plan must be prepared with an effective date no later than one year (versus the normal three years) after the effective date of the current valuation. As at March 31, 2019, the ratio of solvency assets to solvency liabilities is 0.815 (i.e., \$1,389,267,000 divided by \$1,704,795,000). Therefore, the next valuation of the Plan must be at a date no later than March 31, 2020.

D. Hypothetical Wind-up Basis: Financial Position as at March 31, 2019

The financial position of the Plan on a wind-up basis as of March 31, 2019 is as follows:

TOTAL PLAN – WIND-UP BALANCE SHEET (ALL FIGURES IN \$000'S)

	March 31, 2018	March 31, 2019
Wind-up assets		
Market value of PTF assets*	\$705,337	\$727,614
Estimated wind-up expenses	(1,200)	(1,200)
Market value of RTF assets*	603,150	661,653
Total wind-up assets	\$1,307,287	\$1,388,067
Wind-up liabilities		
PTF wind-up liabilities	\$940,579	\$976,187
RTF wind-up liabilities	662,113	728,608
Total wind-up liabilities	\$1,602,692	\$1,704,795
Wind-up excess / (deficiency)	(\$295,405)	(\$316,728)

* Net of (payables) / receivables

As shown above, on a wind-up basis there is a deficiency of \$316,728,000 in the Plan after providing for settlement of all accrued benefit entitlements as at March 31, 2019.

SECTION IV FUNDING REQUIREMENTS

A. Current Service Costs

The Plan's current service cost (also referred to as the "normal cost") is the value of the benefits accruing to members in the year following the valuation, determined on a going concern basis.

The table below summarizes the results of the Plan's current service cost for the 12-month period following March 31, 2019.

CURRENT SERVICE COST

	% of Payroll	(\$000's)
Estimated pensionable earnings		262,242
Total annual current service cost	17.32%	45,428
Employee regular contributions	6.06%	15,900
Employee supplementary contributions	2.00%	5,245
Employer matching regular contributions	6.06%	15,900
Balance of cost = employer "overmatching contribution"	3.20%	8,383
Employer contributions as a percentage of employee contributions	114.89%	

The cost of benefits accruing in respect of the year following the valuation date is \$45,428,000. This amounts to 17.32% of active contributory payroll. The employee required and employer matching contributions in the year amount to \$15,900,000 (i.e., 6.06% of contributory payroll) each. Employees are also required to contribute supplementary contributions in the amount of \$5,245,000 (i.e., 2.00% of contributory payroll). The balance remaining (i.e., \$8,383,000 or 3.20% of payroll) represents employer "overmatching contributions". Total employer contributions (i.e., 15,900,000 + 8,383,000 = 24,283,000, or 6.06% + 3.20% = 9.26% of payroll) amount to 114.89% of employee contributions.

The total current service cost has decreased from 17.37% of payroll to 17.32% of payroll, as a result of the net impact of demographic changes. The following sets out an approximate reconciliation of the change in the total current service cost as a percentage of payroll:

CURRENT SERVICE COST RECONCILIATION

	% of Payroll
Total current service cost as at the previous valuation	17.37%
Demographic changes	(0.05%)
Total current service cost as at the current valuation	17.32%

Sensitivity Analysis

Below we show the impact on the 2019/20 current service cost as at March 31, 2019 of a one percentage point drop in the discount rate assumption. All other assumptions were kept unchanged.

CURRENT SERVICE COST SENSITIVITY

	Impact of 1% Drop
Total Current Service Cost	\$55,835,000

The change in the discount rate would have the impact of increasing the current service cost by \$10,407,000 or 22.9% as at March 31, 2019. With employee regular and supplementary contributions remaining at a total 8.06% of pay, the employer contribution requirement (i.e., matching and overmatching) would rise to 13.23% of pay (i.e., a total cost of 21.29% of pay).

B. Special Payments

In addition to current service contributions, special payments are required in order to amortize the Plan's going concern unfunded liability, as identified in Section III.

The following table summarizes the previously established going concern special payments:

REMAINING ANNUAL SPECIAL PAYMENTS FROM PREVIOUS VALUATION AS AT MARCH 31, 2018

Payment Type	Date Established	Term Remaining as at March 31, 2019	Annual Payment (\$000's)	Present Value of Remaining Payments ¹ (\$000's)
Going Concern	March 31, 2010	6 years	787	3,996
Going Concern	March 31, 2013	9 years	1,976	13,875
Total			\$2,763	\$17,871

¹ Present value of payments calculated at 6.00% interest rate.

The valuation as at March 31, 2019 has revealed actuarial gains on a going concern basis. These gains can be applied to reduce the previously scheduled going concern unfunded liability special payments (in accordance with the Regulations under the Nova Scotia *Pension Benefits Act*) to the extent that the remaining special payments are sufficient to amortize the March 31, 2019 unfunded liability. The resulting special payment schedule is as follows:

ANNUAL SPECIAL PAYMENTS²

Payment Type	Date Established	Term Remaining as at March 31, 2019	Annual Payment (\$000's)	Present Value of Remaining Payments ² (\$000's)
Going Concern	March 31, 2013	9 years	918	6,442
Total			\$918	\$6,442

² Present value of payments calculated at 6.00% interest rate.

The minimum required special payments are \$918,000 per annum for the next 9 years, and are sufficient to amortize the March 31, 2019 unfunded liability of \$6,442,000. These payment levels will be reviewed at the time of the next actuarial valuation, due no later than March 31, 2020.

The Plan has a solvency funding exemption as per subsection 19(6) of the Regulations under the Nova Scotia *Pension Benefits Act*, therefore, no special payments are required to amortize the Plan's solvency deficiency.

C. Maximum Contribution

The maximum employer contribution prior to the next valuation is equal to the wind-up deficiency plus employer portion of the current service cost (\$316,728,000 + \$15,900,000 + \$8,383,000 = \$341,011,000).

D. Timing of Contributions

Employer contributions for current service must be paid in monthly installments, no later than 30 days after the month for which contributions are payable. Special payments must be paid by equal monthly installments, within 30 days following the end of each month.

SECTION V SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

The following represents our primary conclusions as a result of our actuarial valuation of the Dalhousie University Staff Pension Plan as at March 31, 2019:

1. As at the valuation date, there exists a going concern unfunded actuarial liability of \$6,442,000.
2. The Plan has a solvency deficiency of \$312,446,000 as at March 31, 2019 (after including the present value of 5 years' worth of scheduled special payments).
3. The going concern unfunded actuarial liability must be amortized according to the special payment schedule detailed in Section IV. In summary, special payments are \$918,000 for the next 9 years.
4. The cost of benefits accruing in respect of the year following the valuation date is \$45,428,000, which amounts to 17.32% of active contributory payroll. Employee regular contributions (6.06% of payroll) and supplementary contributions (2.00% of payroll) are expected to generate contributions of 8.06% of payroll. In addition to the University's matching regular contribution (6.06% of payroll), employer overmatching contributions of 3.20% of payroll are required.
5. The adequacy and appropriateness of this funding level should be reviewed at the next actuarial valuation of this Plan, which should take place as of March 31, 2020 at the latest.
6. For purposes of paragraph 147.2(2)(d) of the *Income Tax Act* (Canada), the excess surplus based on the going concern valuation was nil as of March 31, 2019.
7. If the Plan were to be wound up on the valuation date, the value of Plan assets would be less than the Plan's wind-up liabilities by an amount of \$316,728,000.
8. The transfer ratio of the Plan is 81.5%.
9. The previous year credit balance as at March 31, 2019 is \$0.
10. We are not aware of any events that occurred between the valuation date and the date this report was completed that would have a material impact on the results of this valuation.

We shall be pleased to provide any additional details or explanations you may require regarding any of the matters dealt with in this report.

SECTION VI ACTUARIAL OPINION

We hereby certify that in our opinion,

- (i) the data on which the valuation is based are sufficient and reliable for the purposes of the valuation as described in Section I;
- (ii) the assumptions described herein are appropriate for the purposes of the valuation; and
- (iii) the methods employed in the valuation are appropriate for the purposes of the valuation.

This report has been prepared, and our opinions given, in accordance with accepted actuarial practice in Canada. It has also been prepared in accordance with the funding and solvency standards set by the Nova Scotia *Pension Benefits Act*.

Nonetheless, emerging experience, differing from the assumptions, will result in gains or losses which will be revealed in future valuations.

Respectfully submitted,



Jeff Turnbull, FSA, FCIA



Colleen Glenn, FSA, FCIA, CERA

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APPENDIX A PLAN ASSETS

The Plan's assets are currently managed in such a way as to allow for a mix of equity and fixed income investments. Several independent fund managers, who deal at arm's length with the University, manage the assets, which are segregated into two trusts: the Pension Trust Fund (PTF) invests the accumulated contributions in respect of active Members and supports benefits payable during the period of active membership, and the Retirees' Trust Fund (RTF) supports pension payments after retirement. The two trusts, together and in aggregate, form the portfolio of assets supporting the Plan.

Reconciliation of Plan Assets

Financial statements of the Plan's holdings, in aggregate by asset class, were provided to us by the University for this valuation. The tables below contain summaries of the revenue accounts for the PTF and the RTF, respectively, based on the information supplied in respect of the period covered by this valuation (i.e., April 1, 2018 through March 31, 2019).

RECONCILIATION OF ASSETS IN THE PENSION TRUST FUND (ALL FIGURES IN \$000'S)

For the Year Ending	March 31, 2019
Market value at beginning of period	\$713,760
Employee regular contributions	15,096
Employee supplementary contributions	4,850
Employee other contributions*	1,114
Employer contributions	25,653
Net investment income	52,898
Net change in payables	2,329
Transfer to RTF	(66,728)
Benefit withdrawals	(11,759)
Market value at end of period	\$737,213

* Employee other contributions include additional voluntary contributions, past service purchases, and transfers from other plans.

**RECONCILIATION OF ASSETS IN THE RETIREES' TRUST FUND
(ALL FIGURES IN \$000'S)**

For the Year Ending	March 31, 2019
Market value at beginning of period	\$598,141
Transfers in from PTF	66,728
Net investment income	41,463
Net change in payables	309
Pension payments	(48,535)
Market value at end of period	\$658,106

Performance of Plan Assets

The following table summarizes the net rate of return on the Plan's assets over the past year.

**PENSION FUND RATES OF RETURN
(NET OF EXPENSES)**

12 Months Ending Mar. 31	Pension Trust Fund	Retirees Trust Fund	Total Plan (i.e., Combined PTF and RTF)
2019	7.6%	6.9%	7.3%

APPENDIX B ACTUARIAL METHODS AND ASSUMPTIONS

A. Valuation of Assets

For the valuation as at March 31, 2019, the market value of assets, plus any net payables / receivables was used as the actuarial value of assets. This is the same asset valuation method as was used in the previous valuation.

The table below summarizes the calculation of the going concern asset value as at March 31, 2019, rounded to the nearest \$1,000.

ACTUARIAL VALUE OF ASSETS (ALL FIGURES IN \$000's)

	March 31, 2019
Market value of assets	\$1,395,319
Benefits Payable	(4,426)
Expenses Payable	(1,626)
Actuarial value of assets	\$1,389,267

B. Going Concern Valuation

For the purposes of a going concern valuation, we select actuarial assumptions with a long-term focus. That is, we anticipate that the pension plan will continue indefinitely into the future. Actuarial assumptions are selected giving consideration to historical trends, future expectations and pension plan specific experience, where possible. The assumptions chosen are expected to produce a stable pattern of funding and meet the Plan sponsor's desire to minimize potential for significant shortfalls or deficits in the future.

The purpose of this part of our analysis is to determine an appropriate method and series of assumptions to make proper allowance for the Plan's future liabilities by way of payment of pensions and other benefits. In making these calculations, assumptions must be made as to:

- the probability that a particular payment will be made at a certain time (for example, depending upon whether or not the individual concerned survives to that date); and
- the expected amount of each such payment.

In order to do this, we make a series of assumptions in connection with the many factors which will have a bearing upon the future financial operation of the Plan. These include the following:

- future rates of mortality (and the corresponding life expectancies of the Plan members and their spouses);
- future rates of salary increase for members of the Plan;
- the rate of increase in the maximum pension (as mandated by the *Income Tax Act*) that the Plan is allowed to pay;
- future rates of employee turnover (withdrawal from the Plan);
- the age at which retirement occurs; and
- the propensity for members who are eligible for an immediate pension, but who may choose between the receipt of such pension and a lump-sum termination benefit, to choose the latter.

Finally, we give consideration to the rate of interest that will be earned on the assets of the pension funds in future years.

As part of our process of analysis, all of these factors have received consideration. Where applicable, we have taken into account the actual experience of this pension plan. However, it should be noted that, from a statistical point of view, actual experience data developed from a single pension plan has limited validity unless the number of plan members is very large. Therefore, it becomes necessary to take into account statistics developed from many other larger pension plans.

The assumptions used for the going concern valuation are the same as those used for the previous valuation. The assumptions we have adopted, as well as a brief commentary where appropriate, are described below.

Going Concern Discount Rate Assumption

We have maintained the pre-retirement discount rate assumption at 6.00% per annum.

The economic assumptions (i.e., those related to interest rates and inflation) for this valuation are based on reasonable expectations with respect to the relationships among key economic variables over the long term, as well as the expected impact of those economic variables on the investment performance of the pension fund given the fund's investment policy.

We have taken a "best estimate" approach to the determination of the discount rate, based on the expected future investment return on the assets of the pension plan. In particular, our approach consists of:

- determining the best estimate of long-term, expected future investment returns for the various asset classes in which the Plan invests;
- combining these best estimate, long-term expected future investment returns to reflect the Plan's investment policy, thereby creating an "expected" fund return that is a weighted average of the asset class returns;
- including an allowance for additional return due to active versus passive management, and the impact of rebalancing and diversification, which we have considered appropriate in the circumstance as a result of stochastic modelling specific to the Plan's target asset mix;
- and making appropriate provision for expenses and a provision for adverse deviation.

The result of our analysis is depicted in the following table:

DISCOUNT RATE

	Discount Rate
Unadjusted “best estimate” return	6.30%
Less fees	(0.60%)
Plus value added return from active management	0.40%
Plus “rebalancing and diversification effect”	0.50%
Less provision for adverse deviation	(0.60%)
Equals discount rate	6.00%

The unadjusted best estimate asset return assumption was determined using the Plan’s target investment mix and the expected return for each asset class. Expected returns are developed each year through a rigorous stochastic modelling process. This model is designed to simulate all key economic and market variables over thousands of different paths that are path-wise consistent. Key variables include bond yields (nominal and real), inflation, equity market returns, and alternative asset class returns. Adjustments for specific approaches to investment implementation are applied to asset class expected returns where appropriate. The details are depicted in the following table:

Asset Class	Target Weight	Expected Return
Universe bonds	6.5%	3.30%
Corporate bonds	5.5%	3.90%
Core Plus bonds	12.5%	4.00%
Private debt	5.5%	5.60%
Canadian equity	12.0%	7.20%
US equity	14.0%	7.20%
International equity	11.0%	7.20%
Emerging market equity	3.0%	8.00%
Real estate	10.5%	5.60%
Infrastructure	7.0%	6.60%
Private equity	12.5%	9.30%
Total portfolio	100.0%	6.30%

In respect of the post-retirement period, we have maintained the assumption used in the last valuation and as specified in the Plan Rules, i.e., 4.55% per annum (except 4.95% per annum for members who retired before June 30, 1994, and 4.65% per annum for members who retired between June 30, 1994 and June 30, 1996). These post-retirement interest rates incorporate some conservatism in that they include (in accordance with plan rule 9(b)) a “holdback as a provision against life expectancy variations and other contingencies”.

Salary Scale

Pensions from the Plan are based on the average of an employee's best 3 years of earnings. Since wage levels typically increase over time, an employee's best 3 years of earnings usually occur towards the end of their career. In conducting our valuation, it is prudent to project each employee's accrued pension to the time of their retirement by projecting their earnings level, and this is accomplished through the use of a salary scale assumption.

In respect of the salary scale assumption, the assumption used in the March 31, 2018 actuarial valuation was a flat 2.75% per annum assumption combined with the following merit/promotion table:

- 1.75% for ages below 45;
- 1.00% for ages between 45 and 55; and
- 0.00% for ages after 55.

This assumption has not changed with the March 31, 2019 actuarial valuation. This assumption reflects the low inflation environment that exists at the present time (and that is expected to persist), as well as the future expected pressure on University budgets and funding levels.

Maximum Pension

Pensions are capped by regulation at \$3,025.56 per year of service for retirements occurring in 2019. It is expected that this maximum will be increased in accordance with an average wage index from 2019 onward. For purposes of the valuation, we have assumed that the maximum pension will increase after 2019 by 2.75% per annum (i.e., equal to the base salary scale rate). This is the same assumed rate of increase as in the March 31, 2018 valuation.

Going Concern Mortality Assumption

We have retained the mortality assumption used in the previous valuation, i.e., the 2014 Canadian Pensioners' Mortality (Public Sector) Table (CPM 2014 Public) projected generationally with improvement scale CPM-B. The CPM 2014 Public table represents the best available information to date on the mortality patterns of Canadians participating in, or retired from, defined benefit pension plans in the public sector, and as such was considered to offer the most appropriate estimate of mortality patterns for participants in this plan.

Based on this assumption, the life expectancy at age 65 in 2019 is 22.9 years for a male and 24.7 years for a female.

We expect to review the mortality assumption from time to time, both to reflect continued societal improvements in mortality, as well as the development of new actuarial tables and standards.

Retirement Age

There has been no change to the retirement age assumption. Rates of retirement for ages prior to 65 were developed based on experience. In 2009, mandatory retirement was removed in the province of Nova Scotia. Given experience for retirement at ages over 65 is very minimal for Dalhousie, we relied on a research paper prepared by Statistics Canada titled “Mandatory Retirement Rules and the Retirement Decisions of University Professors in Canada” for purposes of determining expected retirement rates for ages between 65 and 71.

Age of Member	Probability of Retirement
55	2%
56	2%
57	3%
58	3%
59	4%
60	6%
61	7%
62	12%
63	12%
64	12%
65	60%
66	25%
67	25%
68	25%
69	25%
70	25%
71	*100%

** Note the 100% reflects the fact that, under the Income Tax Act, all Members, whether or not they retire from active employment, must commence their pension by no later than the end of the year in which they turn age 71*

With regard to retirement rates between age 65 and age 71, we will continue to monitor actual Dalhousie experience over time, to determine whether the assumed rates of retirement need to be adjusted to be more “Dalhousie-specific”.

SOCC Take-up Rate

Upon termination of employment, a Member is offered the choice between a lump sum transfer from the Plan and a deferred pension. The value of the lump sum transfer is the greater of (i) the Member's "Sum of Contributions Compounded", or "SOCC", which generally represents the Member's required contributions, times two, plus interest, and (ii) the commuted value of the deferred pension.

For each Member of the Plan, we have projected the Member's SOCC to the assumed points of early and normal retirement, and, at each point, compared the SOCC to the amount that would be transferred from the Pension Trust Fund to the Retirees Trust Fund were the Member to retire at that point.

There has been no change to the SOCC Take-up Rate since the previous valuation. We assume that 40% of members (where their projected SOCC is greater than the projected PTF-to-RTF-transfer) at all ages up to and including age 65 would take their SOCC rather than receive an immediate pension.

Withdrawal Rates

The scale of "termination of membership" rates remains unchanged from rates used in the previous valuation. The following table details the rates used in the current valuation.

Service of Member	Termination Rates
1 year	12.0%
2 years	10.2%
3 years	8.7%
4 years	8.4%
5 years	8.4%
6-10 years	6.5%
11-15 years	2.7%
16-20 years	2.7%
21-25 years	0.8%
More than 25 years	0.0%

Termination benefits are projected to each service date, and the liability determined. Projected liabilities take into consideration the minimum withdrawal benefit of twice contributions, plus interest.

Proportion Married and Spouse's Age

We have continued to assume that seventy percent of active members have a spouse at the time of their retirement or death.

We have continued to assume that male spouses are 2 years older than their female counterparts.

Going Concern Actuarial Methods

The actuarial cost method used in conducting this valuation is the projected unit credit method. This is the same method as was used in the previous valuation.

In using this method, as a first step, a calculation is made of the liability in respect of all benefits that have accrued to members on account of service up to and including the valuation date. This represents the "accrued liability". It should be noted that this calculation takes into account projected future pay increases for each member up to and including expected retirement date.

As a completely separate process, the current year cost has been calculated (using the same actuarial assumptions). This represents the cost of providing the benefits that will accrue in respect of the 12-month period following the valuation date. This is compared with the amount of required employee contributions, supplementary contributions, and regular matching employer contributions over that period. The difference represents the additional minimum required employer contribution (referred to as the "overmatching contribution") necessary in order for these benefits to be properly funded.

For an individual member, the funding pattern produced by the projected unit credit cost method is one that increases (both in dollar terms and as a percentage of salary) over time. However, for the group as a whole, if the average age remains constant (which can occur through the retirement of older members and the addition of new, younger members) and salary levels increase in accordance with the salary scale, the contribution rate recommended under this method will remain relatively constant. If the Plan's average age increases, on the other hand, the current year cost will also increase. Such increases would be revealed in future valuations.

The following table details the actuarial assumptions that have been used in the going concern valuation:

GOING CONCERN VALUATION ACTUARIAL ASSUMPTIONS

March 31, 2019	
Interest	
▪ Pre-retirement:	6.00% p.a.
▪ Post-retirement:	4.55% p.a. for members who retire(d) after June 30, 1996, 4.95% p.a. for members who retired before June 30, 1994, and 4.65% p.a. for members who retired between June 30, 1994 and June 30, 1996
Salary scale:	2.75% p.a. plus merit/promotion scale of 1.75% p.a. for ages below 45, 1.00% p.a. for ages between 45 and 55, and 0.00% for ages after 55
Maximum pension:	\$3,025.56 in 2019, increasing at 2.75% p.a. thereafter
Mortality:	2014 Canadian Pensioner Mortality tables (Public Sector) projected generationally with mortality improvement at Scale CPM-B
Retirement age:	In accordance with the retirement rates described previously in this section
Withdrawals:	In accordance with the termination rates described previously in this section
Percentage married:	70% of active members
Spouse's age:	Actives: Males spouses are assumed to be 2 years older than their female counterparts Pensioners: Actual spouse's age
Interest credited on employee contributions:	2.50% p.a.
SOCC take-up assumption:	40% at all ages up to and including age 65
Funding method:	Projected Unit Credit

C. Solvency Valuation

The Nova Scotia *Pension Benefits Act* prescribes a solvency valuation. A solvency valuation permits the regulator to assess the solvency of the Plan should it terminate or wind-up effective on the valuation date. That is, an assessment is made as to whether the assets of the pension fund would be sufficient if no further benefits were provided and all members were paid their entitlements.

For active members not eligible for immediate retirement (i.e., those under age 55), the interest rate used for calculating solvency liabilities was 2.70% p.a. for 10 years and 3.20% p.a. thereafter. These rates were determined in accordance with Section 3500 of the Canadian Institute of Actuaries ("CIA") Standards of Practice – Pension Commuted Values with rates in effect for March 2019. The mortality assumption used was the CPM-2014 (Combined) mortality table projected with Scale CPM-B.

For retired lives and active members 55 or older, the solvency liabilities were calculated using an interest rate of 2.92% per annum and the Canadian Pensioner Mortality (CPM2014 Combined) tables projected generationally with mortality improvement at Scale CPM-B. These assumptions represent the estimated basis for settlement of the Plan’s obligations for retired lives by the purchase of insured annuities on the valuation date, and were determined in accordance with the Canadian Institute of Actuaries Educational Note Supplement entitled “Guidance for Assumptions for Hypothetical Wind-up and Solvency Valuations Update – Effective March 31, 2019 and Applicable to Valuations with Effective Dates Between March 31, 2019 and December 30, 2019”.

Note that the solvency valuation does not make any assumptions about future pay increases or future termination of employment, since all members are assumed to terminate on the valuation date. The actuarial assumptions for the solvency valuation are described in the following table:

SOLVENCY VALUATION ACTUARIAL ASSUMPTIONS

March 31, 2019	
Interest:	For actives < 55, 2.70% p.a. for 10 years, 3.20% p.a. thereafter For pensioners and actives > 55, 2.92% p.a.
Mortality:	2014 Canadian Pensioner Mortality tables (Combined) projected generationally with mortality improvement at Scale CPM-B
Salary scale:	None
ITA maximum pension:	\$3,025.56 per year of service
Retirement age:	Age that maximizes the value of the benefits
SOCC take-up assumption:	100% for Active Members less than Age 55; 0% for Active Members greater than Age 55
Withdrawals:	None
Percentage married:	70% of active members
Spouse’s age:	Actives: Males spouses are assumed to be 2 years older than their female counterparts Pensioners: Actual spouse’s age
Cost method:	Termination method

D. Hypothetical Wind-up Valuation

The only difference between solvency and wind-up assumptions for the Dalhousie Plan is that the wind-up valuation assumptions must account for indexation. However, at the time of this valuation there is no difference in wind-up and solvency assumptions because interest rates are at levels low enough that there is no expectation of excess interest indexing. Therefore, the wind-up valuation liability assumptions are the same as those used in the solvency valuation.

APPENDIX C PLAUSIBLE ADVERSE SCENARIOS

A plausible adverse scenario is considered to be one that will occur in the short term (immediately to one year) with a likelihood of occurring between 1 in 10 and 1 in 20 based on the opinion of the actuary. The purpose of the following scenarios is to illustrate the impact on the Plan's financial position of the following adverse but plausible assumptions relative to the best estimate assumptions selected for the Plan's going concern valuation. The purpose of disclosing these results is to demonstrate the sensitivity of the funded status and annual current service cost between March 31, 2019 and March 31, 2020 to certain key risk factors affecting the Plan. The results of the scenarios selected are shown in the table below, with a description of each scenario following.

	Going Concern Results at March 31, 2019 (\$000's)	Plausible Adverse Scenario Results at March 31, 2019		
		Interest rate risk* (\$000's)	Deterioration of Asset Values* (\$000's)	Longevity Risk (\$000's)
Going concern assets	1,389,267	1,403,807	1,180,877	1,389,267
Going concern liabilities	1,395,709	1,417,261	1,395,709	1,424,854
Going concern excess / (unfunded liability)	(6,442)	(13,454)	(214,832)	(35,587)
Current service cost	45,428	47,282	45,428	46,218
Deficit funding requirement	918	1,887	22,410	4,530
Change in going concern liabilities		21,552	-	29,145
% change in going concern liabilities		1.54%	-	2.09%
Change in current service cost		1,854	-	790
% change in current service cost		4.08%	-	1.74%
Change in deficit funding requirement		969	21,492	3,612
Discount rate	6.00%	5.60%	6.00%	6.00%
Life expectancy (in years) for a retiree age 65	24	24	24	25

* Scenario shown represents the median of the worst 10% of stochastic simulations.

Interest Rate Risk

This scenario illustrates the sensitivity of the funded status of the Plan and current service cost to an immediate change in the market interest rates underlying fixed income investments.

In order to assess the impact of a decrease in interest rates of a magnitude consistent with a 1 in 10 likelihood of occurring, we have used the same stochastic model that is used to determine the going concern discount rate (see Appendix B). The stochastic model is based on 5,000 simulations of projected financial variables, including long-term yields on fixed income investments and asset class returns. Our long-term best estimates for these variables, and the going concern discount rate are based on the median values of these 5,000 simulations.

To determine the sensitivity to interest rate risk, and the resulting impact on Plan assets and liabilities, we have:

- considered the hypothetical going concern discount rate over the 500 trials where fixed income yields are lowest at the one-year horizon, and
- determined the decrease in median long-term fixed income yields over the 500 trials where fixed income yields are the lowest at the one-year horizon.

Based on the above analysis, we have determined that the going concern discount rate would decrease by 40 basis points as of March 31, 2019, and long-term yields on fixed income investments would decrease by 50 basis points.

Based on the estimated duration of the Plan assets, liabilities and current service cost, we have then determined the estimated change to the Plan's funded status under the interest rate risk scenario.

Deterioration of Asset Values

This scenario illustrates the sensitivity of the funded status of the Plan to short-term shock which causes a reduction in the market value of assets, with no change to the liabilities of the Plan. This scenario is assumed not to impact the current expectation of the long-term rate of return, and consequently, the going concern discount rate.

In order to assess the impact of a decrease in asset values of a magnitude consistent with a 1 in 10 likelihood of occurring, we have used the same stochastic model that is used to determine the going concern discount rate (see Appendix B). The stochastic model is based on 5,000 simulations of projected financial returns, including long-term yields on fixed income investments and asset class returns.

To determine the sensitivity to a deterioration in asset values based on the Plan's target asset mix, we have reviewed the 500 trials where investment returns are lowest at the one-year horizon and determined that at the median scenario, the market value of assets would decrease by 15% as of March 31, 2019.

Longevity Risk

This scenario illustrates the sensitivity of the funded status of the Plan to pension plan members living longer than expected. The impact of this scenario was determined using a one-year age setback to the mortality table used for the going concern valuation as of March 31, 2019. This is a more conservative mortality assumption than currently employed.

APPENDIX D MEMBERSHIP DATA

The data in respect of active membership (including members on disability or leave of absence), and in respect of all pensioners and deferred pensioners are maintained on a computerized pension administration system called Ariel. The system is updated by Retirement Services, a unit of Dalhousie University's Human Resources Department. The information was extracted by Morneau Shepell (the Ariel vendor) and submitted to us in electronic format. A summary of the data is shown in this Appendix.

We subjected this data to a number of tests of reasonableness and consistency, including the following:

- a member's (and partner's as applicable) age is within a reasonable range;
- all dates remained unchanged from the data used in the previous actuarial valuation of the Plan;
- salaries increased at a reasonable rate;
- credited service increased by a reasonable amount;
- pensions in pay changed by a reasonable amount (e.g., by the amount of indexing applied for retired members, etc.);
- a member's gender did not change;
- the form of pension payment did not change (other than resulting from the death of a retired member);
- the pension amounts on the pensioner file was compared with the payments reported in the financial statements for the Plan; and
- we examined the additions to and deletions from each of the data files (i.e., the files for active employees, pensioners and terminated members entitled to a deferred vested pension) since the previous valuation to determine whether all Plan members were accounted for in this valuation, to check for duplicate records and to confirm pension amounts.

For some employee groups, the raw data did not reflect outstanding salary increases that were effective prior to the valuation date. In these cases, Dalhousie provided us with the retroactive salary increase amounts.

Where there was data missing, we made the following assumptions for pensioners:

- Forms of pension were assumed to be the same as in the previous valuation
- Male spouses are assumed to be 2 years older than their female counterparts

All of our tests had satisfactory results, or the data was corrected. However, the tests may not have captured all deficiencies in the data. We have also relied on the Plan administrator's certification on the quality of the data.

RECONCILIATION OF MEMBERSHIP

	Active	Terminated non-vested members	Deferred (via PTF)	Deferred (via RTF)	Pensioners and survivors	Total
Number as at March 31, 2018	3,078	322	490	120	1,226	5,236
New entrants	266	-	-	-	-	266
Returned to active	3	-	(3)	-	-	-
Retirements	(94)	-	(8)	(11)	113	-
Terminations						
▪ Deferred or pending (via PTF)	(80)	-	80	-	-	-
▪ Deferred (via RTF)	(8)	-	-	8	-	-
▪ Fully settled	(40)	(3)	(48)	-	-	(91)
Deaths	(4)	-	1	-	(25)	(28)
New survivors	-	-	-	-	15	15
New limited member pensions	-	-	-	-	2	2
Number as at March 31, 2019	3,121	319	512	117	1,331	5,400

STATISTICAL PROFILE OF ACTIVE MEMBERS

	Number*	Average Age	Average Credited Service	Expected Salary, Year Following March 31, 2019	Average Accumulated Contributions**
Males	1,241	49.3	12.1	\$96,047	\$94,325
Females	1,810	48.1	11.3	\$79,342	\$67,478
Total	3,051	48.6	11.6	\$86,136	\$78,398

* These figures do not include 70 individuals who have reached 35 years pensionable service and are therefore no longer accruing benefits for future service.

** Includes past service contributions and transfers into the Plan

MARCH 31, 2018 TABLES FOR COMPARISON

Total	3,008	48.7	11.8	\$84,628	\$82,257
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STATISTICAL PROFILE OF DEFERRED PENSIONERS (UNDER DEFERRAL VIA THE PTF*)

	Number	Average Age	Average Annual Lifetime Pension
Males	213	48.9	\$8,602
Females	299	47.3	\$6,732
Total	512	48.0	\$7,510

* Under "deferral via the PTF", the individual is entitled to a deferred pension, or the commuted value of the pension (determined in accordance with CIA standards).

MARCH 31, 2018 TABLES FOR COMPARISON

Total	490	47.9	\$7,420
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STATISTICAL PROFILE OF DEFERRED PENSIONERS (UNDER DEFERRAL VIA THE RTF*)

	Number	Average Age	Average Deferred Account Balance
Males	9	62.7	\$665,149
Females	13	62.0	\$585,801
Total	22	62.3	\$618,262

* Under "deferral via the RTF", the individual is entitled to a pension that can be provided by their deferred account balance (determined on an actuarial equivalent basis).

MARCH 31, 2018 TABLES FOR COMPARISON

Total	23	62.5	\$569,926
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STATISTICAL PROFILE OF PENSIONERS (INCLUDING SURVIVORS)

	Number	Average Age	Average Annual Lifetime Pension
Males	609	73.9	\$48,786
Females	722	71.6	\$29,103
Total	1,331	72.7	\$38,109

MARCH 31, 2018 TABLES FOR COMPARISON

Total	1,226	72.6	\$37,814
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SALARY/ AGE/ SERVICE DISTRIBUTION FOR ALL ACTIVE MEMBERS

Age	Service (years)							Total
	0-4	5-9	10-14	15-19	20-24	25-29	30+	
	20							20
20-24	921,302							921,302
	46,065							46,065
	87	8						95
25-29	4,556,486	430,078						4,986,563
	52,373	53,760						52,490
	158	65	9					232
30-34	10,670,647	4,215,152	481,746					15,367,545
	67,536	64,848	53,527					66,239
	184	109	42	8				343
35-39	14,469,360	8,840,010	2,764,765	537,208				26,611,343
	78,638	81,101	65,828	67,151				77,584
	143	134	95	31	4			407
40-44	11,444,633	12,068,843	8,592,449	2,404,346	345,518			34,855,789
	80,032	90,066	90,447	77,560	86,380			85,641
	114	98	145	101	37	4		499
45-49	9,414,570	8,229,310	15,060,448	10,616,928	2,709,970	229,158		46,260,385
	82,584	83,973	103,865	105,118	73,242	57,290		92,706
	108	74	103	106	63	46	11	511
50-54	8,925,548	6,274,205	9,323,897	11,531,729	5,865,304	3,135,471	627,732	45,683,885
	82,644	84,787	90,523	108,790	93,100	68,162	57,067	89,401
	71	73	84	76	72	76	54	506
55-59	5,856,790	5,381,967	6,268,326	6,952,291	7,675,490	6,935,815	3,295,786	42,366,465
	82,490	73,726	74,623	91,478	106,604	91,261	61,033	83,728
	17	48	56	49	69	60	42	341
60-65	1,278,820	4,482,938	4,554,231	4,866,111	8,328,335	6,108,689	4,637,604	34,256,727
	75,225	93,395	81,326	99,308	120,701	101,811	110,419	100,460
	10	8	23	16	8	17	15	97
Over 65	827,309	883,989	2,315,307	1,802,293	1,173,104	2,293,640	2,196,423	11,492,066
	82,731	110,499	100,666	112,643	146,638	134,920	146,428	118,475
	912	617	557	387	253	203	122	3,051
Grand Total	68,365,463	50,806,491	49,361,170	38,710,906	26,097,722	18,702,773	10,757,545	262,802,070
	74,962	82,344	88,620	100,028	103,153	92,132	88,177	86,136

Key: Each cell contains the following information (in order): a "count" of the number of members who fit within the cell's parameters (for instance, the cell in the upper left corner indicates that 20 members are between the ages of 20 and 24, **and** have between 0 and 4 years of service); the total salaries paid to the members in the cell; and the average salary of members in the cell (the upper left cell, for instance, shows that the 20 members earned a total of \$921,302, or an average of \$46,065).

Note: These figures do not include individuals who have reached 35 years pensionable service and are therefore no longer accruing benefits for future service. There are 70 such members.

SALARY/ AGE/ SERVICE DISTRIBUTION FOR ACTIVE MEMBERS – MALES ONLY

Age	Service (years)							Total
	0-4	5-9	10-14	15-19	20-24	25-29	30+	
	2							2
20-24	79,860							79,860
	39,930							39,930
	25							25
25-29	1,398,042							1,398,042
	55,922							55,922
	58	21	4					83
30-34	4,149,392	1,492,054	226,927					5,868,373
	71,541	71,050	56,732					70,703
	71	44	15	5				135
35-39	5,981,744	3,761,025	965,770	377,770				11,086,310
	84,250	85,478	64,385	75,554				82,121
	54	57	39	10	3			163
40-44	4,678,916	5,563,783	3,815,110	866,455	238,024			15,162,287
	86,647	97,610	97,823	86,645	79,341			93,020
	52	48	66	48	17			231
45-49	4,586,297	4,539,759	7,200,283	5,672,610	1,208,577			23,207,525
	88,198	94,578	109,095	118,179	71,093			100,465
	36	36	44	47	24	22	1	210
50-54	3,132,979	3,233,590	4,253,011	5,583,432	2,590,771	1,689,270	59,886	20,542,938
	87,027	89,822	96,659	118,796	107,949	76,785	59,886	97,824
	24	31	27	32	37	30	8	189
55-59	2,165,068	2,211,346	2,515,685	3,326,528	4,212,891	3,233,097	610,922	18,275,537
	90,211	71,334	93,174	103,954	113,862	107,770	76,365	96,696
	6	20	16	16	41	24	26	149
60-65	411,358	1,796,646	1,354,647	2,095,531	5,247,410	2,573,357	3,138,769	16,617,719
	68,560	89,832	84,665	130,971	127,986	107,223	120,722	111,528
	3	5	12	6	5	11	12	54
Over 65	334,778	586,046	1,381,971	686,753	740,591	1,484,617	1,740,516	6,955,271
	111,593	117,209	115,164	114,459	148,118	134,965	145,043	128,801
	331	262	223	164	127	87	47	1,241
Grand Total	26,918,433	23,184,250	21,713,403	18,609,078	14,238,264	8,980,342	5,550,093	119,193,863
	81,325	88,490	97,370	113,470	112,112	103,222	118,087	96,047

Key: Each cell contains the following information (in order): a "count" of the number of members who fit within the cell's parameters; the total salaries paid to the members in the cell; and the average salary of members in the cell.

Note: These figures do not include individuals who have reached 35 years pensionable service and are therefore no longer accruing benefits for future service.

SALARY/ AGE/ SERVICE DISTRIBUTION FOR ACTIVE MEMBERS – FEMALES ONLY

Age	Service (years)							Total
	0-4	5-9	10-14	15-19	20-24	25-29	30+	
	18							18
20-24	841,441							841,441
	46,747							46,747
	62	8						70
25-29	3,158,444	430,078						3,588,522
	50,943	53,760						51,265
	100	44	5					149
30-34	6,521,255	2,723,098	254,819					9,499,173
	65,213	61,889	50,964					63,753
	113	65	27	3				208
35-39	8,487,616	5,078,985	1,798,995	159,438				15,525,033
	75,112	78,138	66,629	53,146				74,640
	89	77	56	21	1			244
40-44	6,765,717	6,505,060	4,777,339	1,537,891	107,495			19,693,502
	76,019	84,481	85,310	73,233	107,495			80,711
	62	50	79	53	20	4		268
45-49	4,828,273	3,689,551	7,860,166	4,944,318	1,501,393	229,158		23,052,859
	77,875	73,791	99,496	93,289	75,070	57,290		86,018
	72	38	59	59	39	24	10	301
50-54	5,792,568	3,040,616	5,070,886	5,948,297	3,274,533	1,446,201	567,846	25,140,947
	80,452	80,016	85,947	100,819	83,962	60,258	56,785	83,525
	47	42	57	44	35	46	46	317
55-59	3,691,722	3,170,621	3,752,641	3,625,763	3,462,599	3,702,717	2,684,864	24,090,927
	78,547	75,491	65,836	82,404	98,931	80,494	58,367	75,997
	11	28	40	33	28	36	16	192
60-65	867,462	2,686,292	3,199,584	2,770,580	3,080,924	3,535,331	1,498,835	17,639,008
	78,860	95,939	79,990	83,957	110,033	98,204	93,677	91,870
	7	3	11	10	3	6	3	43
Over 65	492,531	297,942	933,337	1,115,541	432,514	809,023	455,907	4,536,794
	70,362	99,314	84,849	111,554	144,171	134,837	151,969	105,507
	581	355	334	223	126	116	75	1,810
Grand Total	41,447,030	27,622,242	27,647,767	20,101,828	11,859,457	9,722,431	5,207,452	143,608,207
	71,337	77,809	82,778	90,143	94,123	83,814	69,433	79,342

Key: Each cell contains the following information (in order): a "count" of the number of members who fit within the cell's parameters; the total salaries paid to the members in the cell; and the average salary of members in the cell.

Note: These figures do not include individuals who have reached 35 years pensionable service and are therefore no longer accruing benefits for future service.

PENSIONERS

Age at Valuation	Female	Male	Total
40 to 44	1		1
	4,404		4,404
	4,404		4,404
45 to 49		1	1
		1,274	1,274
		1,274	1,274
50 to 54	4		4
	104,616		104,616
	26,154		26,154
55 to 59	32	10	42
	805,772	137,965	943,737
	25,180	13,796	22,470
60 to 64	100	47	147
	2,809,310	1,721,466	4,530,776
	28,093	36,627	30,822
65 to 69	216	148	364
	7,022,001	6,239,566	13,261,567
	32,509	42,159	36,433
70 to 74	152	156	308
	4,339,160	8,670,835	13,009,995
	28,547	55,582	42,240
75 to 79	99	135	234
	3,000,036	7,580,958	10,580,993
	30,303	56,155	45,218
80 to 84	55	53	108
	1,511,113	2,473,537	3,984,650
	27,475	46,671	36,895
85 to 89	36	35	71
	804,326	1,576,005	2,380,331
	22,342	45,029	33,526
90 to 94	23	19	42
	558,531	1,042,344	1,600,875
	24,284	54,860	38,116
95 and over	4	5	9
	53,361	266,619	319,980
	13,340	53,324	35,553
Total count by gender	722	609	1,331
Total lifetime benefit	21,012,631	29,710,568	50,723,199
Total average lifetime benefit	29,103	48,786	38,109

Key: Each cell contains the following information (in order): count, sum of lifetime retirement benefit, and average lifetime retirement benefit.

APPENDIX E SUMMARY OF PLAN PROVISIONS

The following is a summary of the Plan's main provisions in effect on March 31, 2019. This summary is not intended as a complete description of the Plan. For specific details of the Plan provisions, reference should be made to the Plan text.

Effective Date of the Plan

Contributions to this Plan (and eligibility for pension benefits) commenced effective September 1, 1959.

Eligibility and Membership

Up to June 30, 1996 all full-time employees and regular part-time employees of Dalhousie University are eligible to join the Plan upon completion of at least 75 days of employment with the University. After June 30, 1996 eligibility for membership occurs at the date of employment.

Statutory part-time employees may elect to join the Plan following completion of two consecutive calendar years of employment during which, in each of the calendar years, their earnings were at least 35% of the Canada Pension Plan YMPE, or their hours worked were at least 700.

Required Contributions

- A. By Members: 4.65% of the first \$5,000 of annual salary plus 6.15% of annual salary in excess of \$5,000 (where the salary is ultimately limited to that which would produce a pension entitlement in the year equal to the maximum pension for that year according to the provisions of the *Income Tax Act*), plus Supplementary Contributions in the amount of 2.00% of the same annual salary.
- B. By the University: the amount required to meet the cost of all benefits not met by the Members' required contributions.

Interest

Any refund of contributions, payable either to a member or his or her estate, includes interest credited each year from the 1st of October at a rate based on the average of the yields of 5-year personal fixed term chartered bank deposit rates (CANSIM series V122515) over the 12-month period ending on the most recent June 30th.

Normal Retirement Date

The normal retirement date for all employees is the July 1st immediately following attainment of age 65 except for those members who were on full-time staff prior to July 1, 1964. In the latter case, normal retirement date is the 1st day of September immediately following the attainment of age 65.

Early Retirement

A member who has attained age 55 may retire at any time prior to attainment of his or her normal retirement age. In these circumstances, the member would receive a reduced pension in accordance with the following table:

Full Years Prior to Age 65	Early Retirement Adjustment Factor	
	For benefits earned after June 30, 2004	For benefits earned up to June 30, 2004
10	.63	.76
9	.66	.80
8	.69	.84
7	.72	.88
6	.75	.92
5	.78	.95
4	.81	.98
3	.85	1.00
2	.90	1.00
1	.95	1.00

These adjustment factors are interpolated where retirement occurs between anniversary dates. Under Phase Three of the Surplus Use Agreement (1996), these reduction factors are applicable prior to exact age 65 instead of the normal retirement date.

Partial Early Retirement and Reduced Workload Arrangements

Any regular full-time staff member may apply for partial early retirement through an approved reduced workload arrangement provided that he or she has completed at least three years of Continuous full-time or regular part-time employment since last date of hire. A Reduced Workload Period shall be for a fixed term. Participation in and approval of such RWA is by mutual consent, and is not extended as a matter of right.

In respect of any Member working under an RWA, the following shall apply:

- (1) the calculation of the Member's pension benefit shall be based on the Member's Nominal Salary (pre-RWA Salary with adjustments for salary increases) rather than the actual Salary received by the Member under RWA;
- (2) the Member will make pension contributions through payroll deduction based on the actual Salary received during the period rather than the Member's Nominal Salary on which the benefits are based; and
- (3) the University will pay contributions on behalf of the Member in respect of the difference between the Member's actual Salary and Nominal Salary as well as its contributions on the Nominal Salary.

This provision does not mean that a member can retire and commence receipt of pension benefits and continue to accrue benefits simultaneously. Such action is not permitted.

Deferment of Pension Benefits

Any member eligible to receive a pension (either at normal or early retirement age) may elect to defer commencement of pension payments until some later date (but not beyond the end of the calendar year the member attains age 71 in any event). In these circumstances, the actuarial equivalent value of the member's pension as of the selected retirement date is transferred into the Retirees' Trust Fund, and is credited with investment income until the member's pension payments start. The actual pension payable from deferred retirement date is calculated on a consistent actuarial equivalent basis. The ultimate pension at date of commencement must not exceed the maximum pension payable from a Defined Benefit Plan, as prescribed in the *Income Tax Act*.

Pension at Normal Retirement

The pension provided under this Plan is expressed as a certain percentage of the average of the best three years of remuneration received by the member.

For the total period of membership in the Plan, the percentage applicable is 2% multiplied by the number of years of participation during that period.

The annual amount of lifetime pension payable to members, excluding any benefits derived from the member's AVCs, for the calendar year in which these benefits commence to be paid shall not exceed the product of:

- A. the number of years of Pensionable Service of the Member which, when combined with the Member's Pensionable Service prior to January 1, 1992, if any, will not exceed 35 years, and
- B. the lesser of:
 - (1) 1/9 of the Money Purchase Limit in the calendar year in which benefits commence, and
 - (2) 2% of the average of Member's best three consecutive years of Compensation in respect of the Employer.

Type of Pension

Pensions are payable throughout the lifetime of a Pensioner. For service up to June 30, 2004, the minimum guaranteed number of payments for single members or for married members electing a single life form of pension is 120 months. For married members electing a joint form of pension, the normal form of pension is a lifetime pension payable to the member and spouse jointly. The benefit is payable at a rate reduced by one third to the spouse should the spouse survive the member, provided that the spouse is not younger than the member by more than 60 months. If the spouse is younger by more than 60 months, the benefit is reduced in consideration of the actual age of the spouse to be actuarially equivalent to the benefit payable to a member whose spouse is 60 months younger. No fewer than 60 monthly payments shall be paid in any event.

For service from July 1, 2004, the normal form of pension for all members is a lifetime pension payable to the member, with a guarantee that no fewer than 84 payments shall be paid in any event.

A member with a spouse is required to receive a pension which includes a 60% survivor's pension; such pension being the actuarial equivalent of the pension otherwise payable in the normal form. Other optional forms of pension are available on an actuarial equivalent basis subject to signature of a waiver form by member and spouse.

Adjustment to Pensions in Course of Payment

Effective July 1, 1982, the decision was made to discontinue the previous policy of purchasing immediate annuities from life insurance companies in respect of retiring employees. Accordingly, a separate Retirees' Trust Fund was established and, in respect of employees retiring on or after July 1, 1982, pension payments are being made directly from this Retirees' Trust Fund.

At the time of retirement, a capital sum is transferred from the Pension Trust Fund into the Retirees' Trust Fund in respect of each retiring employee; the amount of this transfer being based on the mortality and interest assumptions used in the most recent actuarial valuation of this Pension Plan.

The three-year average investment yield on the Retirees' Trust Fund in excess of the post-retirement interest assumption (PRIA) will be used to fund indexing of pensions in the manner described below, subject to a "hold back" as a provision against life expectancy variations and other contingencies of 0.1% for Members who retired prior to June 30, 1994, 0.4% for Members who retired on or after June 30, 1994 but before June 30, 1996 and 0.5% for Members who retired on or after June 30, 1996.

In addition, accumulated pension increases shall not exceed corresponding accumulated increases in the Consumer Price Index.

Notwithstanding the above, in the event that the applicable three-year average investment yield on the Retirees' Trust Fund does not exceed the PRIA by the "hold back" percentages, then there shall be no adjustment to pensions in course of payment for that year except as may be provided with surplus funds. Furthermore, in these circumstances, there will be a corresponding reduction in the rate of increase of pensions in the following year or years of such amount, or amounts that would be required to bring pensions in course of payment to the same level that would apply if negative adjustments had been made in those years when the three-year average investment yield on the Retirees' Trust Fund did not exceed the PRIA by the "hold back" percentages.

The first such increase took effect as of January 1, 1984, and further increases after that date – to the extent an adjustment can be made – take place on each subsequent 1st of January.

Death Benefits Before Retirement

Upon death prior to retirement, the benefit payable to the member's spouse or beneficiary is an amount equal to the sum of:

- (i) The greater of
 - a. The Member's required contributions plus interest in respect of service prior to January 1, 1988, plus 100% of the Commuted Value of the Member's pension accrued to the date of death, in respect of service after December 31, 1987; and
 - b. An amount equal to the Sum of Contributions Compounded of the Member up to the date of death; and
- (ii) The Member's additional voluntary contributions plus interest.

In lieu of the lump sum described above, the Member's spouse can elect to receive a lifetime pension equal to the actuarial equivalent of the lump sum.

Disability Benefit

In the event that a member becomes totally and permanently disabled prior to normal retirement date, and becomes eligible to receive benefits under the University's Long Term Disability Plan, provision is made for the continuation of joint contributions to the Pension Plan while the member is receiving LTD Benefits until normal retirement age. At that time, the disability benefit ceases, and a pension will become payable under this Plan with full credit being given both for years of active participation and for years when the member continued to contribute to the Plan while disabled.

Termination of Employment

A Member who terminates employment is entitled to a deferred pension payable at the normal retirement date. A Member can elect to receive an early retirement pension which is the pension payable at the normal retirement date, with the appropriate actuarial reduction factors applied, as outlined above.

In lieu of a pension benefit as described above, a Member may elect to have the greater of (i) their Locked-in Contributions, and (ii) the Commuted Value of the Member's pension accrued to the date of termination, including any 50% rule excess employee contributions, transferred to a Registered Plan permitted under the *Pension Benefits Act* and the *Income Tax Act*, provided that such arrangement is administered as locked-in as required by the *Pension Benefits Act*.

APPENDIX F EMPLOYER CERTIFICATION

On behalf of Dalhousie University, I hereby certify that the employee data provided to Eckler Ltd. for the purposes of the actuarial valuation of the Dalhousie University Staff Pension Plan as at March 31, 2019 are accurate and complete.

LAURIE CREELMAN
Name

Laurie Creelman
Signature

Senior Pension Advisor & Manager,
Title Retirement Services

October 22, 2019
Date