

Section 3 - Investment Information

External management fees are treated as a reduction of the investment revenue of the Fund rather than as a budgeted administrative expense.

| Table 11.3 Investment Fees by Manager | |
|---|--------------------------|
| Fiscal Year Ended June 30, 2017 | |
| (Dollar Amounts in Thousands) | |
| <u>Manager</u> | <u>Total Fees</u> |
| <u>U.S. Equity</u> | |
| Radcliffe Capital Management, L.P. | \$ 2,984 |
| Total - U.S. Equity | 2,984 |
| <u>Non - U.S. Equity</u> | |
| Acadian Asset Management, LLC | 960 |
| Baillie Gifford Overseas Ltd. | 6,525 |
| BlackRock Financial Management, Inc. | 3,433 |
| BlackRock Institutional Trust Company, N.A. | 2,281 |
| Fidelity Institutional Asset Management LLC | 1,138 |
| Marathon Asset Management Limited | 3,153 |
| Oberweis Asset Management, Inc. | 1,487 |
| Pareto Investment Management, Ltd. | 1,057 |
| QS Investors, LLC | 610 |
| Wasatch Advisors, Inc. | 4,519 |
| Total - Non - U.S. Equity | 25,163 |
| <u>Fixed Income</u> | |
| AllianceBernstein L.P. | 420 |
| Apollo European Principal Finance Fund II(Dollar A), L.P. | 1,907 |
| Avenue Energy Opportunities Fund, L.P. | 1,931 |
| Avenue Europe Special Situations Fund III (U.S.), L.P. | 979 |
| Bain Capital Credit Managed Account (PSERS), L.P. | 1,687 |
| Bain Capital Distressed and Special Situations 2013 (A), L.P. | 1,013 |
| Bain Capital Distressed and Special Situations 2016 (A), L.P. | 814 |
| Bain Capital Middle Market Credit 2010, L.P. | 281 |
| Bain Capital Middle Market Credit 2014, LP | 1,505 |
| BlackRock Financial Management, Inc. | 11,342 |
| Bridgewater Associates, LP | 21,719 |
| Brigade Capital Management, LLC | 16,777 |
| Capula Investment Management, LLP | 975 |
| Cargill Financial Services Corporation | 2,891 |
| Carlyle Energy Mezzanine Opportunities Fund II, L.P. | 3,121 |
| Carlyle Energy Mezzanine Opportunities Fund-Q, L.P. | 1,305 |
| Cerberus Levered Loan Opportunities Fund I, L.P. | 274 |
| Cerberus Levered Loan Opportunities Fund II, L.P. | 2,760 |
| Cerberus PSERS Levered Loan Opportunities Fund, L.P. | 4,533 |

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Table 11.3 Investment Fees by Manager
Fiscal Year Ended June 30, 2017
(Dollar Amounts in Thousands)
(continued)

| <u>Manager</u> | <u>Total Fees</u> |
|---|-------------------|
| <u>Fixed Income (continued)</u> | |
| Galton Onshore Mortgage Recovery Fund III, L.P. | \$ 1,377 |
| Hayfin SOF II USD Co-Invest, L.P. | 12 |
| Hayfin SOF II USD, L.P. | 339 |
| Hayfin Special Opportunities Credit Fund (Parallel), L.P. | 2,341 |
| ICG Europe Fund V, L.P. | 1,583 |
| ICG Europe Fund VI, L.P. | 1,059 |
| International Infrastructure Finance Company, L.P. | 1,343 |
| Latitude Management Real Estate Capital IV, Inc. | 124 |
| LBC Credit Partners II, L.P. | 674 |
| LBC Credit Partners III, L.P. | 3,638 |
| LBC-PSERS Credit Fund, L.P. | 842 |
| Mariner Investment Group, LLC | 1,672 |
| Oaktree Loan Fund 2X, LP | 27 |
| Pacific Investment Management Company (PIMCO) | 1,633 |
| Park Square - PSERS Credit Opportunities Fund, L.P. | 1,601 |
| Penn Mutual Asset Management, LLC | 13 |
| Pugh Capital Management, Inc. | 197 |
| PSERS TAO Partners Parallel Fund, L.P. | 2,974 |
| Radcliffe Capital Management, L.P. | 1,851 |
| Sankaty Credit Opportunities IV, L.P. | 1,459 |
| SEI Investments Company | 686 |
| Templeton Investment Counsel, LLC | 1,669 |
| TOP NPL (A), L.P. | 21 |
| TPG Opportunities Partners II (A), L.P. | 305 |
| TPG Opportunities Partners III (A), L.P. | 2,261 |
| Varde Scratch and Dent Feeder I-A, L.P. (The) | 349 |
| Varde Scratch and Dent Fund, L.P. (The) | <u>2,241</u> |
| Total - Fixed Income | 108,525 |
| <u>Real Estate-Direct Ownership</u> | |
| Charter Oak Advisors, Inc. | 1,207 |
| GF Management, Inc. | 131 |
| Grosvenor Investment Management U.S., Inc. | 50 |
| L & B Realty Advisors, L.L.P. | <u>104</u> |
| Subtotal - Real Estate-Direct Ownership | 1,492 |
| <u>Real Estate-Partnerships/Funds</u> | |
| AG Core Plus Realty Fund III, L.P. | 457 |
| AG Core Plus Realty Fund IV, L.P. | 531 |

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Table 11.3 Investment Fees by Manager
Fiscal Year Ended June 30, 2017
(Dollar Amounts in Thousands)
(continued)

| <u>Manager</u> | <u>Total Fees</u> |
|--|-------------------|
| <u>Real Estate-Partnerships/Funds (continued)</u> | |
| Almanac Realty Securities V, L.P. | \$ 314 |
| Almanac Realty Securities VI, L.P. | 312 |
| Almanac Realty Securities VII, L.P. | 1,360 |
| Apollo Real Estate Finance Corporation | 189 |
| Ares European Real Estate Fund III, L.P. | 310 |
| Ares European Real Estate Fund IV, L.P. | 1,493 |
| Ares U.S. Real Estate Fund VII L.P. | 583 |
| Ares U.S. Real Estate Fund VIII, L.P. | 1,075 |
| Avenue Real Estate Fund Parallel, L.P. | 872 |
| Bell Institutional Fund IV, LLC | 694 |
| Bell Institutional Fund V, LLC | 956 |
| Bell Institutional Fund VI, L.P. | 415 |
| BlackRock Asia Property Fund III, L.P. | 107 |
| BlackRock Europe Property Fund III, L.P. | 86 |
| Blackstone Real Estate Debt Strategies II, L.P. | 922 |
| Blackstone Real Estate Debt Strategies III, L.P. | 219 |
| Blackstone Real Estate Partners Europe III, L.P. | 1,357 |
| Blackstone Real Estate Partners Europe IV, L.P. | 1,374 |
| Blackstone Real Estate Partners VI.TE.1, L.P. | 1,312 |
| Blackstone Real Estate Partners VII.TE.2, L.P. | 2,585 |
| Blackstone Real Estate Partners VIII, L.P. | 3,750 |
| BPG Co-Investment Partnership L.P. | 11 |
| Brookfield Strategic Real Estate Partners II, L.P. | 2,293 |
| Brookfield Strategic Real Estate Partners, L.P. | 1,524 |
| Cabot Industrial Value Fund IV, L.P. | 1,125 |
| Carlyle Real Estate Fund IV L.P. | 242 |
| Carlyle Real Estate Fund V L.P. | 333 |
| Carlyle Real Estate Fund VI L.P. | 364 |
| Carlyle Real Estate Fund VII L.P. | 997 |
| DRA Growth and Income Fund IX, LLC | 297 |
| DRA Growth and Income Fund VI, L.P. | 524 |
| DRA Growth and Income Fund VII, L.P. | 1,541 |
| DRA Growth and Income Fund VIII, L.P. | 2,384 |
| Exeter Core Industrial Club Fund II, L.P. | 173 |
| Exeter Industrial Value Fund II, L.P. | 94 |
| Exeter Industrial Value Fund III, L.P. | 770 |
| Fortress Investment Fund IV, L.P. | 452 |

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Table 11.3 Investment Fees by Manager
Fiscal Year Ended June 30, 2017
(Dollar Amounts in Thousands)
(continued)

| <u>Manager</u> | <u>Total Fees</u> |
|---|-------------------|
| <u>Real Estate-Partnerships/Funds (continued)</u> | |
| Fortress Investment Fund V (Fund A), L.P. | \$ 1,646 |
| GCM Grosvenor Customized Infrastructure Strategies II, L.P. | 58 |
| International Infrastructure Finance Company II, L.P. | 140 |
| JPMCB Strategic Property Fund | 135 |
| Latitude Management Real Estate Capital III, Inc. | 897 |
| Legg Mason Real Estate Capital II, Inc. | 220 |
| LEM Multifamily Senior Equity Fund IV, L.P. | 633 |
| LEM RE High Yield Debt & Preferred Equity Fund III, L.P. | 773 |
| LEM Real Estate Mezzanine Fund II, L.P. | 99 |
| Pramerica Real Estate Capital VI, L.P. | 325 |
| PRISA | 964 |
| RCG Longview Debt Fund IV, L.P. | 140 |
| RCG Longview Debt Fund V, L.P. | 1,017 |
| RCG Longview Debt Fund VI, L.P. | 460 |
| RCG Longview Equity Fund, L.P. | 367 |
| Senior Housing Partnership Equity Fund IV, L.P. | 649 |
| Senior Housing Partnership Fund V, L.P. | 1,097 |
| Silverpeak Legacy/PSERS, L.P. | 82 |
| Stockbridge Real Estate Fund II, L.P. | 395 |
| Stockbridge Real Estate Fund III, L.P. | 801 |
| Stockbridge Real Estate Fund, L.P. | 2,247 |
| Strategic Partners Fund IV RE, L.P. | 78 |
| UBS Trumbull Property Fund | <u>963</u> |
| Subtotal - Real Estate-Partnerships/Funds | 48,583 |
| <u>Real Estate-Farmland</u> | |
| Prudential Agricultural Group | <u>534</u> |
| Subtotal - Real Estate-Farmland | 534 |
| Total Real Estate | 50,609 |
| <u>Private Equity</u> | |
| Actis Emerging Markets 3, L.P. | 1,883 |
| Actis Global 4 L.P. | 1,794 |
| Apax Europe VII, L.P. | 1 |
| Bain Capital Asia Fund II, L.P. | 1,474 |
| Bain Capital Asia Fund III, L.P. | 2,592 |
| Bain Capital XI, L.P. | 1,370 |

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Table 11.3 Investment Fees by Manager
Fiscal Year Ended June 30, 2017
(Dollar Amounts in Thousands)
(continued)

| <u>Manager</u> | <u>Total Fees</u> |
|--|-------------------|
| <u>Private Equity (continued)</u> | |
| Baring Asia Private Equity Fund III, L.P. | \$ 561 |
| Baring Asia Private Equity Fund IV, L.P. | 2,903 |
| Baring Asia Private Equity Fund V, L.P. | 3,413 |
| Barings Asia Private Equity Fund VI, L.P. | 1,495 |
| Blue Point Capital Partners II (B), L.P. | 153 |
| Blue Point Capital Partners III (B), L.P. | 363 |
| Bridgepoint Europe IV, L.P. | 1,748 |
| Bridgepoint Europe V, L.P. | 2,128 |
| Capital International Private Equity Fund V, L.P. | 678 |
| Capital International Private Equity Fund VI, L.P. | 508 |
| Catterton Growth Partners II, L.P. | 1,040 |
| Catterton Growth Partners III, L.P. | 2,000 |
| Catterton Growth Partners, L.P. | 675 |
| Catterton Partners V, L.P. | 306 |
| Catterton Partners VI, L.P. | 1,239 |
| Catterton Partners VII, L.P. | 1,425 |
| Catterton VIII, L.P. | 94 |
| Cinven Fund (Fourth), L.P. (The) | 193 |
| Cinven Fund (Fifth), L.P. (The) | 1,003 |
| Cinven Fund (Sixth), L.P. (The) | 106 |
| Coller International Partners VI, L.P. | 1,031 |
| Coller International Partners VII, L.P. | 1,497 |
| Crestview Partners II (PF), L.P. | 1,600 |
| Crestview Partners III, L.P. | 1,465 |
| Crestview Partners, L.P. | 250 |
| CVC Capital Partners Asia III Pacific, L.P. | 574 |
| CVC European Equity Partners V (A), L.P. | 730 |
| DCPF VI Oil and Gas Co-Investment Fund, L.P. | 154 |
| Denham Commodity Partners Fund VI, L.P. | 1,098 |
| Energy & Mineral Group Fund III, L.P. | 1,223 |
| Equistone Partners Europe Fund V E, L.P. | 1,243 |
| Evergreen Pacific Partners II, L.P. | 481 |
| First Reserve Fund XI, L.P. | 114 |
| First Reserve Fund XII, L.P. | 1,274 |
| GoldPoint Partners Co-Investment V, L.P. | 500 |
| HgCapital 7, L.P. | 1,669 |
| HGGC Fund II, L.P. | 761 |
| Incline Equity Partners III, L.P. | 277 |

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Table 11.3 Investment Fees by Manager
Fiscal Year Ended June 30, 2017
(Dollar Amounts in Thousands)
(continued)

| <u>Manager</u> | <u>Total Fees</u> |
|--|-------------------|
| Private Equity (continued) | |
| Irving Place Capital Partners III, L.P. | \$ 464 |
| Landmark Equity Partners XIII, L.P. | 319 |
| Landmark Equity Partners XIV, L.P. | 1,500 |
| Milestone Partners II, L.P. | 39 |
| Milestone Partners III, L.P. | 331 |
| Milestone Partners IV, L.P. | 705 |
| New Mountain Partners III, L.P. | 666 |
| New Mountain Partners IV, L.P. | 1,134 |
| New York Life Capital Partners III, L.P. | 431 |
| New York Life Capital Partners IV, L.P. | 360 |
| NGP Natural Resources X, L.P. | 958 |
| NGP Natural Resources XI, L.P. | 1,320 |
| North Haven PE Asia Fund IV, L.P. (Morgan Stanley) | 1,478 |
| Odyssey Investment Partners Fund V, L.P. | 1,971 |
| Orchid Asia V, L.P. | 276 |
| Orchid Asia VI, L.P. | 1,464 |
| PAI Europe IV, L.P. | 752 |
| PAI Europe V, L.P. | 1,059 |
| PAI Europe VI, L.P. | 1,563 |
| Palladium Equity Partners IV, L.P. | 1,137 |
| Partners Group Secondary 2008, L.P. | 1,108 |
| Partners Group Secondary 2011, L.P. | 1,371 |
| Partners Group Secondary 2015 (USD) A, L.P. | 1,371 |
| Permira IV, L.P. | 93 |
| StepStone International Investors III, L.P. | 636 |
| Strategic Partners III-B, L.P. | 500 |
| Strategic Partners IV, L.P. | 253 |
| Strategic Partners V, L.P. | 612 |
| Strategic Partners VI, L.P. | 981 |
| Strategic Partners Fund VII, L.P. | 1,250 |
| Trilantic Capital Partners IV, L.P. | 151 |
| Trilantic Capital Partners V, L.P. | 1,420 |
| Subtotal - Private Equity | 74,760 |

Section 3 - Investment Information

Table 11.3 Investment Fees by Manager
Fiscal Year Ended June 30, 2017
(Dollar Amounts in Thousands)
(continued)

| <u>Manager</u> | <u>Total Fees</u> |
|--|-------------------|
| <u>Special Situations</u> | |
| Apollo Investment Fund VIII, L.P. | \$ 1,173 |
| Avenue Special Situations Fund VI, L.P. | 134 |
| Cerberus Institutional Partners, L.P. (Series Three) | 19 |
| Cerberus Institutional Partners, L.P. (Series Four) | 733 |
| Cerberus Institutional Partners V, L.P. | 1,697 |
| Cerberus Institutional Partners VI, L.P. | 2,599 |
| Clearlake Capital Partners IV, L.P. | 858 |
| GSC Recovery III, L.P. | 270 |
| NYLIM Mezzanine Partners Parallel Fund II, L.P. | 30 |
| OCM Opportunities Fund VII, L.P. | 225 |
| OCM Opportunities Fund VII-B, L.P. | 384 |
| Searchlight Capital II, L.P. | 1,378 |
| Venor Special Situations Fund II, L.P. | 681 |
| Versa Capital Fund I, L.P. | 399 |
| Versa Capital Fund II, L.P. | 1,811 |
| Windjammer Senior Equity Fund IV, L.P. | <u>1,008</u> |
| Subtotal - Special Situations | 13,399 |
| <u>Venture Capital</u> | |
| Aisling Capital III, L.P. | 577 |
| Aisling Capital IV, L.P. | 784 |
| Co-Investment Fund II, L.P. (The) | 1,313 |
| LLR Equity Partners II, L.P. | 20 |
| LLR Equity Partners III, L.P. | 1,593 |
| LLR Equity Partners IV, L.P. | 3,178 |
| Psilos Group Partners III, L.P. | 252 |
| Quaker BioVentures II, L.P. | 890 |
| SCP Private Equity Partners II, L.P. | 422 |
| Starvest Partners II, L.P. | 372 |
| Strategic Partners III-VC, L.P. | 145 |
| Strategic Partners IV VC, L.P. | 188 |
| Summit Partners Growth Equity Fund VIII, L.P. | 1,043 |
| Tenaya Capital V-P, LP | 779 |
| Tenaya Capital VI, L.P. | 1,000 |
| Tenaya Capital VII, L.P. | <u>2,000</u> |
| Subtotal - Venture Capital | 14,555 |
| Total Alternative Investments | \$ 102,714 |

Section 3 - Investment Information

Table 11.3 Investment Fees by Manager
Fiscal Year Ended June 30, 2017
(Dollar Amounts in Thousands)
 (continued)

| <u>Manager</u> | <u>Total Fees</u> |
|---|-------------------|
| <u>Absolute Return</u> | |
| Aeolus Capital Management Ltd. | \$ 6,437 |
| BlackRock Financial Management, Inc. | 1,411 |
| Brevan Howard Asset Management, LLP | 590 |
| Bridgewater Associates, Inc. | 21,317 |
| Brigade Capital Management, LLC | 11,356 |
| Capula Global Relative Value Fund | 14,272 |
| Capula Tail Risk Fund | 7,033 |
| Caspian Select Credit International, Ltd. | 2,748 |
| Caspian Keystone Focused Fund, Ltd. | 187 |
| Garda Asset Management, LLC | 13,274 |
| Independence Reinsurance Partners GP, LLC | 1,388 |
| Nephila Capital Ltd. | 3,674 |
| Oceanwood Capital Management, LLP | 4,295 |
| One William Street Capital Management, L.P. | 9,796 |
| Pacific Investment Management Company (PIMCO) | 24,147 |
| Perry Partners, L.P. | 1,058 |
| Sciens Aviation Special Opportunities Investment Fund II, L.P. | 1,723 |
| Sciens Aviation Special Opportunities Investment Fund III, L.P. | 2,525 |
| Two Sigma Investments, L.P. | 124 |
| Venor Capital Offshore, Ltd. | <u>1,631</u> |
| Total - Absolute Return | 128,986 |
| <u>Commodities</u> | |
| Gresham Investment Management, LLC | 944 |
| Wellington Management Company, L.L.P. | <u>3,188</u> |
| Total - Commodities | 4,132 |
| <u>Master Limited Partnerships</u> | |
| Harvest Fund Advisors, LLC | 3,807 |
| Salient Capital Advisors, LLC | 3,034 |
| Stein Roe Investment Counsel D/B/A Atlantic Trust | <u>1,692</u> |
| Total - Master Limited Partnerships | 8,533 |

Section 3 - Investment Information

Table 11.3 Investment Fees by Manager
Fiscal Year Ended June 30, 2017
(Dollar Amounts in Thousands)

(continued)

| <u>Manager</u> | <u>Total Fees</u> |
|---|--------------------------|
| <u>Risk Parity</u> | |
| AQR Capital Management, LLC | \$ 673 |
| BlackRock Institutional Trust Company, N.A. | 1,978 |
| Bridgewater All Weather Fund @15%, Ltd. | 2,694 |
| Bridgewater Optimal Portfolios, Ltd. | 9,651 |
| D.E. Shaw Investment Management, L.L.C. | <u>8,102</u> |
| Total - Risk Parity | 23,098 |
| Total External Management | 454,744 |
| Total Internal Management | <u>12,787</u> * |
| Total Investment Management | <u>\$ 467,531</u> |

*Internal Management expenses include salaries and fringe benefits of \$8,455 and operating expenses of \$4,332.

Investment Fees and Expenses Initiatives

PSERS continues to pursue several avenues intended to maintain a reasonable cost structure. These initiatives include:

- Identifying opportunities to invest more assets internally. PSERS' current staffing levels are too low to significantly increase internal asset management, but we continue to work with the Administration to look for ways to reduce investment fees by increasing internal investment staff. PSERS continues to believe this is in the best interests of both the Fund and the Commonwealth and, therefore, has included additional positions in the FY2018-19 budget request.
- For external managers making traditional investments, reduce base fees and create better alignment of interests by moving to a lower base fee coupled with a profit share.

- For external managers making traditional and absolute return investments, enter into arrangements for netting of profit shares for managers with multiple PSERS mandates.
- For external managers making non-traditional investments, continue to grow co-investments (which have lower fees and profit shares).
- For external managers making non-traditional investments, move away from paying on committed capital and towards paying on invested capital whenever possible.
- For external managers, re-underwriting all fee arrangements to ensure that the fee arrangements are fair and equitable.