Firefighters' Pension Schemes (Scotland) ('FPS (Scotland)')

Membership data

Actuarial valuation as at 31 March 2020

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26 January 2024

Highlights

FPS (Scotland) valuation data

This report details the membership data for the members of the 1992 Scheme, 2006 Scheme and 2015 Scheme, referred to collectively as FPS (Scotland).

14,550

Members as at
31 March 2020

+ 17.3% vs. 2016

Initial data quality

98.9%

Proportion of 'at 31 March 2020' records provided which we are able to use.

Improvement vs. 93.0% in 2016

Key headlines

Overall, the quality of the FPS (Scotland) valuation data as at 31 March 2020 is high, with a notable improvement compared with the data used for the 2016 valuation.

In forming this opinion, we consider the proportion of individual records which passed our reasonableness checks and which could be used directly for the valuation. This proportion has increased since the last valuation.

Data quality after checks and adjustments

After making the necessary adjustments detailed in this report, we conclude that the data is appropriate for the purpose of the 2020 FPS (Scotland) valuation. However, a different approach to adjusting data could still lead to different valuation results.

Contents

Report on data quality

Appendices

Any terms that appear in this report in underlined text are defined in the Glossary.

At the Government Actuary's Department ('GAD'), we seek to achieve a high standard in all our work. We are accredited under the Institute and Faculty of Actuaries' Quality Assurance Scheme. Our website describes the standards we apply.

1. Introduction

Who is this report for?

This report is addressed to Scottish Ministers.

HM Treasury's Directions ('the Directions') require the scheme actuary to provide information about the scheme and data. The purpose of this report is to provide the data we will be using and to help readers be confident that the results of the valuation are fit for purpose.

Why has the data been collected?

This data is needed to carry out an actuarial valuation of the FPS (Scotland) as at 31 March 2020, in accordance with the Directions. This data will be used to set actuarial assumptions, and together the data and assumptions, will be used to calculate valuation results.

Why is the data important?

The results of the valuation are critically dependent on the quality of the data used. Poor data could lead to employers making different decisions due to paying too high or too low a contribution rate, or to benefit changes being made unnecessarily.

This data is often used for other important work as well, including the annual Resource Accounts.

Results

Assumptions

Data

Data is the first and most important building block of an actuarial valuation.
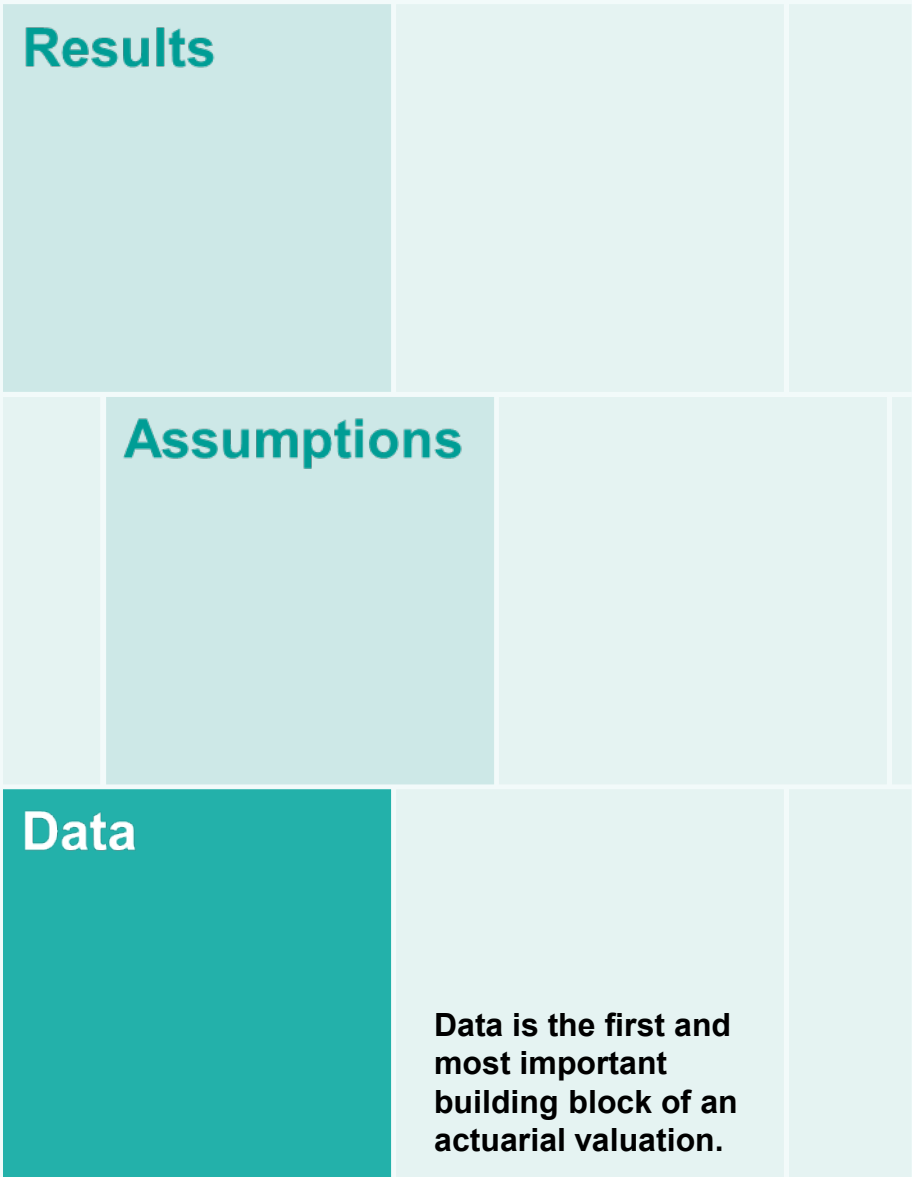
2. Data as at 31 March 2020

Who provided the data?

This data was wholly provided by the administrators of the FPS (Scotland), the Scottish Public Pensions Agency ('SPPA').
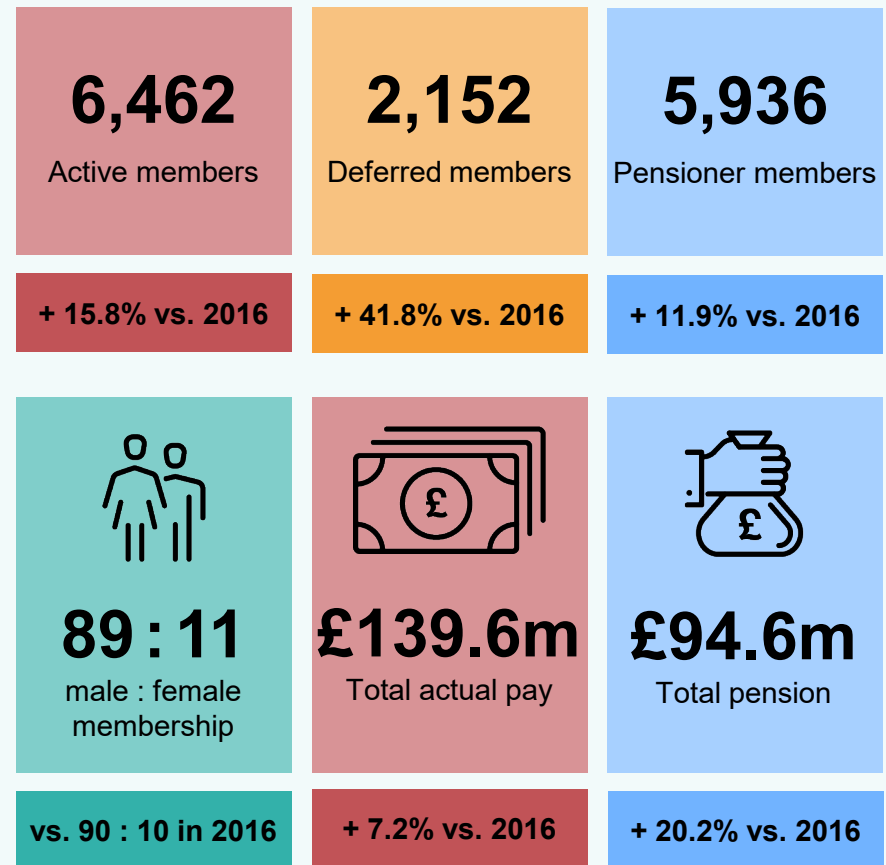
What is the data used for?

It will be used to calculate the results of the 2020 FPS (Scotland) valuation, specifically:

- employer contribution rates due from 2024
- the cost cap cost of the scheme
- actuarial liabilities as at 31 March 2020.

Detailed data summaries are included in **Appendix A – Detailed summaries: data as at 31 March 2020**.

The data discussed in the 'Main report' on pages 5 to 10 and Appendices A to D, excludes the data that has been used as a basis for estimating the additional liabilities in relation to the Matthews options exercise, unless stated otherwise.

A separate data summary relating specifically to the Matthews options exercise is detailed in **Appendix E - Matthews**.

6,462 Active members	**2,152** Deferred members	**5,936** Pensioner members
+ 15.8% vs. 2016	**+ 41.8% vs. 2016**	**+ 11.9% vs. 2016**

89 : 11 male : female membership	**£139.6m** Total actual pay	**£94.6m** Total pension
vs. 90 : 10 in 2016	**+ 7.2% vs. 2016**	**+ 20.2% vs. 2016**

Pension amount includes the April 2020 pension increase.

3. Movements data

Where did the data come from?

This movements data for 2016 to 2020 was wholly provided by the administrators of the FPS (Scotland), SPPA.

What is movements data used for?

We requested movements data in order to review existing assumptions about the scheme membership and propose new assumptions, where appropriate. Agreed assumptions are then used to carry out valuation calculations.
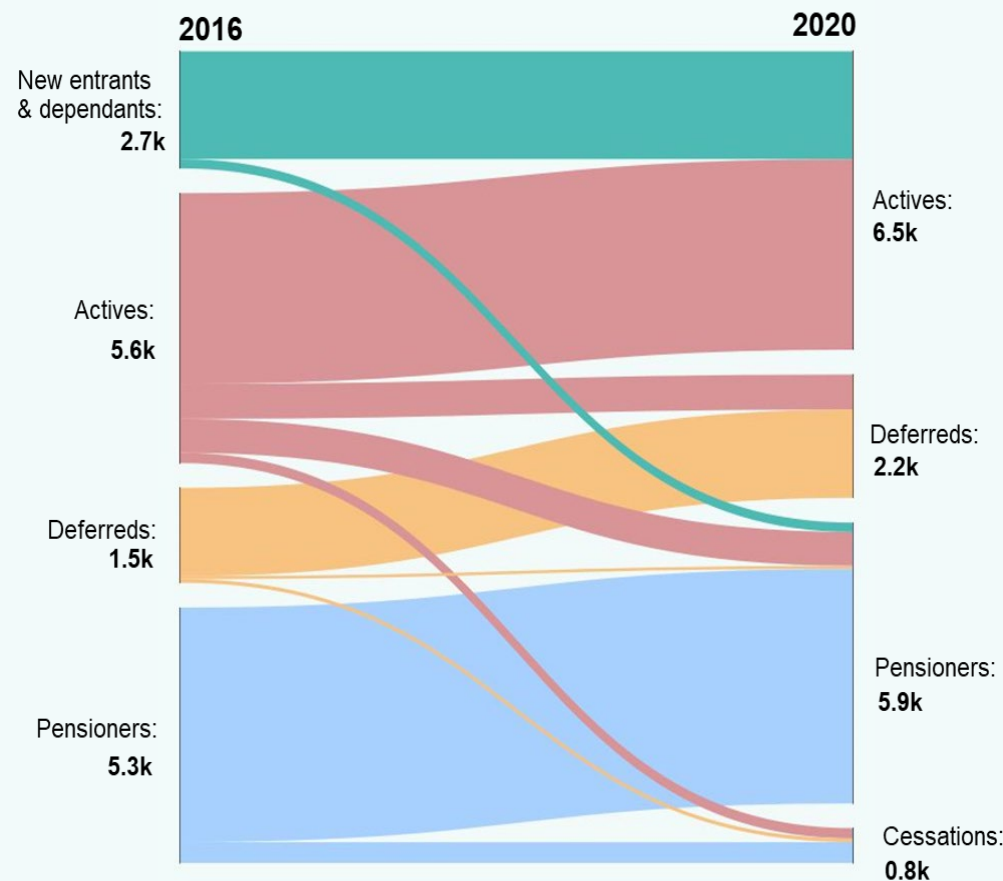
Membership reconciliation

This movements data is used to perform a reconciliation which compares data as at 31 March 2016 and 31 March 2020 against movements occurring between this period to check that membership figures are in agreement.

Where can I find out more?

Detailed data summaries are included in **Appendix B – Detailed summaries: movements data**.

What does the chart show?

The chart below summarises movements between member categories from 2016 to 2020. The thicker the line, the greater the number of member movements occurring.

2016   2020

New entrants & dependants: 2.7k

Actives: 5.6k

Deferreds: 1.5k

Pensioners: 5.3k

Actives: 6.5k

Deferreds: 2.2k

Pensioners: 5.9k

Cessations: 0.8k

4. Checks and adjustments

Why is this data checked?

We carry out checks to ensure this data is fit for purpose for the valuation. These checks also help us to understand and describe limitations on the valuation results due to data omissions. This is also a professional actuarial requirement.

What checks are carried out?

We carry out checks on aggregated statistics produced from the data, and on a record by record basis. A simplified process diagram is shown to the right.

What happens to unreliable data?

Where our checks show that a data record seems to be unreliable, it is either excluded or adjusted. We do this to make sure the data is appropriate for calculating valuation results.

Where we exclude valid data records, we typically compensate for this by scaling up similar, included records.

Where can I find out more?

A detailed summary of what we've done is contained in **Appendix C – Checks, adjustments and uncertainty**.

Checking and adjustment process

- Final data, ready for use
- Data received
- Aggregate checks and reconciliations
- 'Record by record' checks and adjustments
- Liability reconciliations

After checks & adjustments:

After finalising our checks and adjustments, we will consider potential data improvements. We will engage with the scheme manager on any issues we have identified to improve future data submissions, where possible and as appropriate.

5. Data quality

Who is responsible for data quality?

Scottish Ministers are responsible for ensuring appropriate data is provided in order to support the legislative requirement to perform a valuation.

The data that is provided must be in line with our specifications.

Was the data provided of good quality?

The percentage of data which was able to be used and not subject to exclusion is shown to the right. High percentages suggest good quality data.

In terms of the proportion of the records we are able to use, 98.9% is an improvement on the 93.0% used for the 2016 valuation. More detail on this improvement is described on page 25.

Further information on the data quality of the data used to estimate the additional liabilities in relation to the Matthews options exercise is detailed in **Appendix E - Matthews**.

Can the data be used for the valuation?

Yes. After making the adjustments detailed in this report, we believe the data is appropriate for the purposes of the 2020 valuation.

Initial data quality

98.9%
Proportion of 'at 31 March 2020' records provided which we are able to use

Improvement vs. 93.0% in 2016

97.9% Actives	**98.7%** Deferreds	**100%** Pensioners
Improvement vs. 90.0% in 2016	**Improvement vs. 79.8% in 2016**	**Equivalent vs. 100% in 2016**

Data quality after checks & adjustments

☑

After making the necessary adjustments detailed in this report, we conclude that the data is appropriate for the purpose of the 2020 FPS (Scotland) valuation.

6. Impact of data limitations

Do data limitations cause uncertainty?

Yes. Our checks and adjustments aim to ensure that the data is appropriate for use in valuation calculations. However, our checks do not constitute a full audit of the data and our adjustments, although reasonable in our view, may not mean that the dataset adopted accurately reflects the true data of the scheme. This means that there is **residual data uncertainty**.

Is data uncertainty a significant issue?

Residual data uncertainty can potentially have an impact on valuation results, including for example on the cost cap cost of the scheme and any resulting impact on member benefits.

However, in large and complex data sets, this uncertainty is normal and is not usually a cause for concern.

In our view, the residual uncertainty present in this data is not significant enough to dissuade users from taking actions recommended from this valuation.

Where can I find out more?

A more detailed summary of residual data uncertainty is set out in **Appendix C – Checks, adjustments and uncertainty**.

7. Limitations

Data

In preparing this report, GAD has relied on data and other information supplied by the scheme administrators, SPPA, as described in the report. GAD has not sought independent verification around its general completeness and accuracy (beyond our comparisons with the relevant Resource Accounts).

Separately, GAD has relied on the individual data used in the first Matthews options exercise in 2014-2015, which was supplied by SPPA. More information on the limitations regarding this data is detailed in **Appendix E - Matthews**.

Any checks that GAD has made are limited to those described in the report, including those relating to the overall reasonableness and consistency of the data. These checks do not represent a full independent audit of the data supplied.

Throughout this report, the totals given for summed data may not be exactly the same as the sum of the components shown due to rounding effects.

HM Treasury Directions

Throughout this report, in any place where we indicate the potential variability of valuation results – these take into account the HM Treasury Directions for the 2020 valuations

Sharing

This report has been prepared for the use of SPPA and Scottish Ministers. We are content for SPPA to release this report to third parties, provided:

- It is released in full;
- The advice is not quoted selectively or partially;
- GAD is identified as the source of the report, and;
- GAD is notified of such release.

Other than SPPA and Scottish Ministers, no person or third party is entitled to place any reliance on the contents of this report, except to any extent explicitly stated herein. GAD has no liability to any person or third party for any action taken or for any failure to act, either in whole or in part, on the basis of this report.

This report will be published by GAD as part of completing the 2020 valuation of the scheme.

Compliance statement:

This report has been prepared in accordance with the applicable Technical Actuarial Standards: TAS 100 and TAS 300 issued by the Financial Reporting Council ('FRC'). The FRC sets technical standards for actuarial work in the UK.
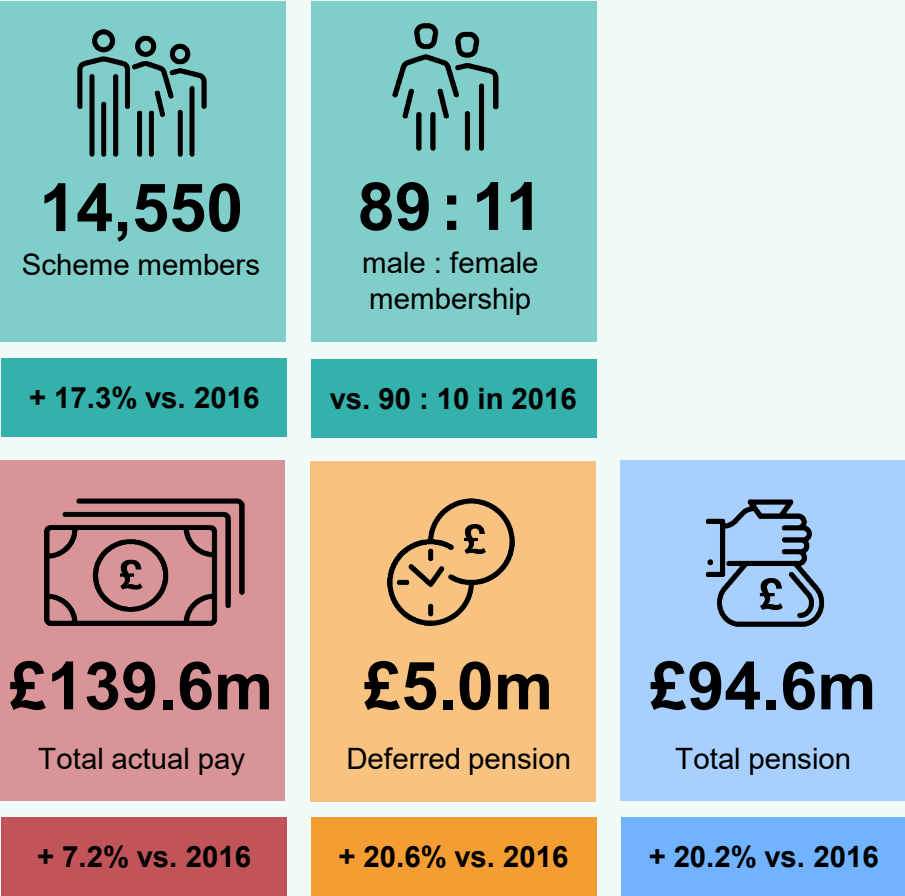
Appendix A

Detailed summaries: Data as at 31 March 2020

Scheme data

As at 31 March 2020

Summary statistics

14,550
Scheme members

+ 17.3% vs. 2016

89 : 11
male : female
membership

vs. 90 : 10 in 2016

£139.6m
Total actual pay

+ 7.2% vs. 2016

£5.0m
Deferred pension

+ 20.6% vs. 2016

£94.6m
Total pension

+ 20.2% vs. 2016

Pension amounts includes the April 2020 pension increase

Membership over time

Actives

Year	Value
2012	5,749
2016	5,580
2020	6,462

Deferreds

Year	Value
2012	618
2016	1,518
2020	2,152

Pensioners

Year	Value
2012	4,735
2016	5,304
2020	5,936
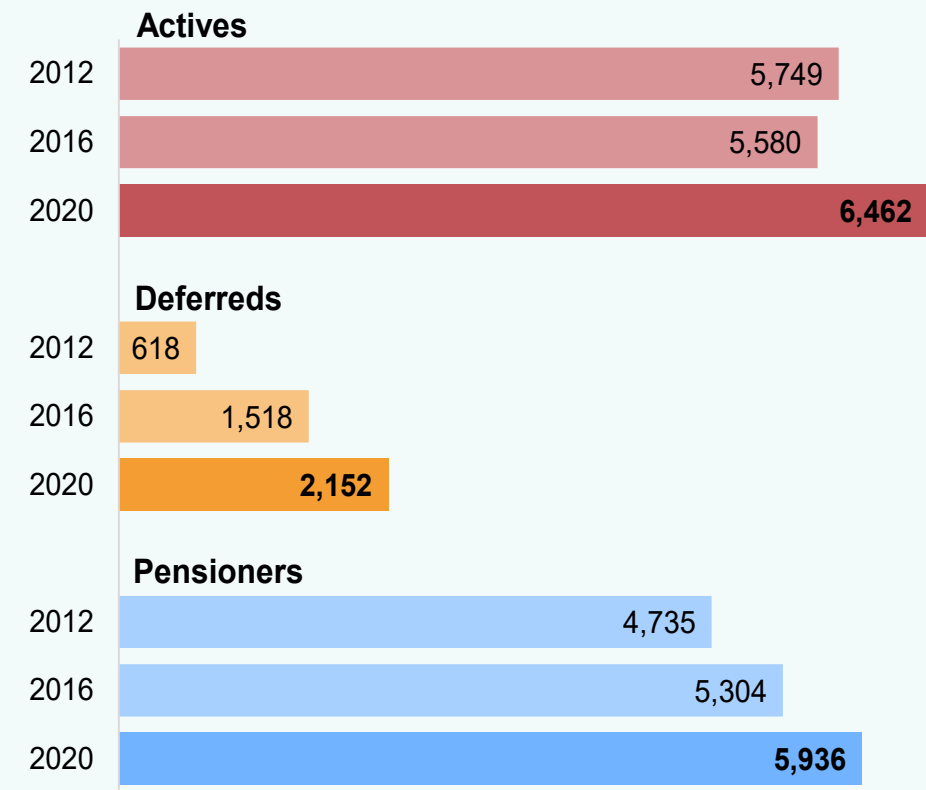
Scheme membership

As at 31 March 2020

Overall, the headcount has increased from 2016 to 2020 for all membership types.

There are significantly more male than female members across all categories.

The numbers of pensioner/dependants begin increasing from around age 48 and peak between ages 50 and 55, as expected.
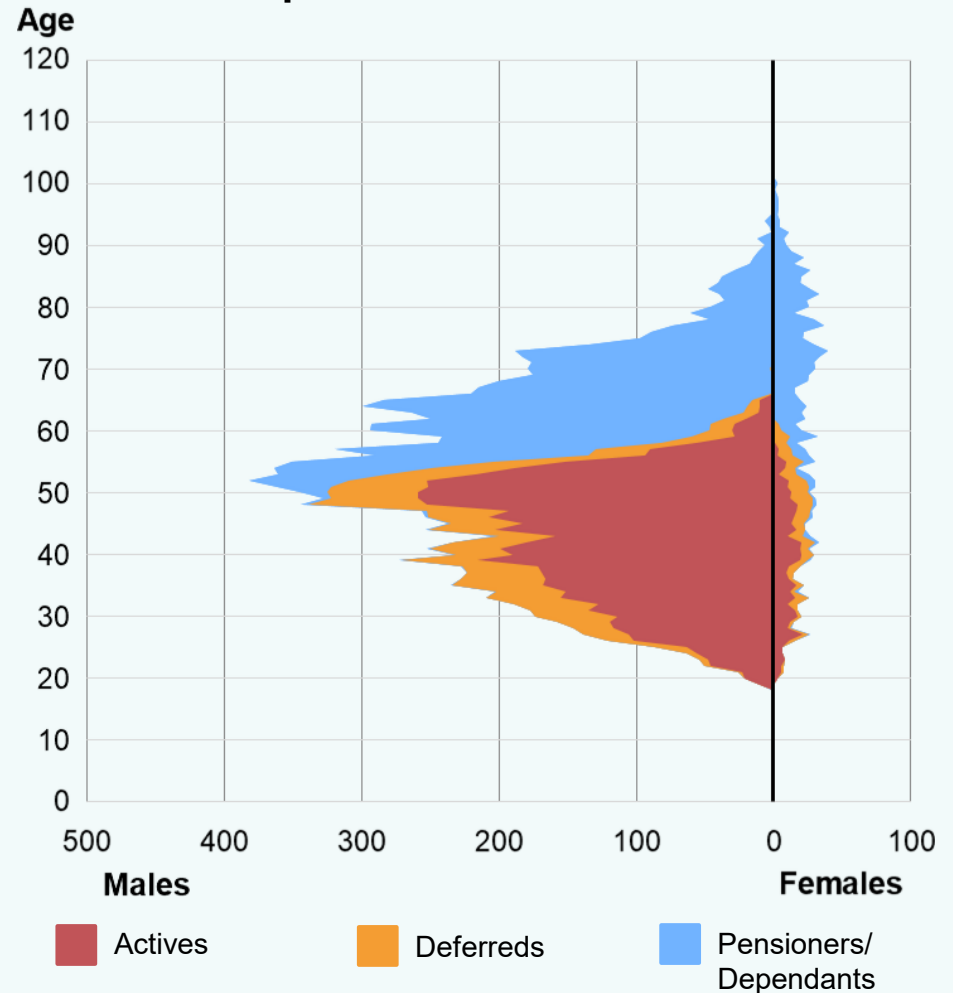
This corresponds with declining numbers of active members and deferred members, particularly over the latter half of this age range.

Some active and deferred members have still not claimed their pensions, despite being over normal pension age.

Where can I see more?

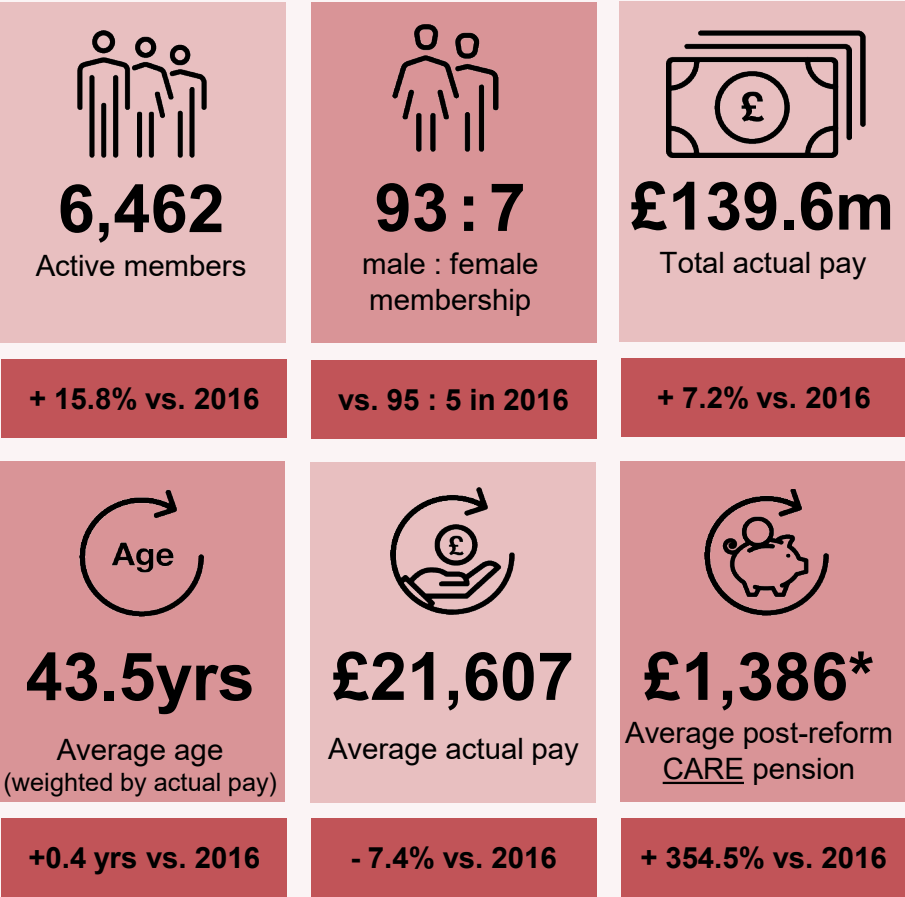**Appendix D – Tables of summary statistics**

Membership distribution

Legend	
Actives	Deferreds	Pensioners/Dependants

Actives

Actives data

As at 31 March 2020

Summary statistics

6,462
Active members

+ 15.8% vs. 2016

93 : 7
male : female membership

vs. 95 : 5 in 2016

£139.6m
Total actual pay

+ 7.2% vs. 2016

43.5yrs
Average age (weighted by actual pay)

+0.4 yrs vs. 2016

£21,607
Average actual pay

- 7.4% vs. 2016

£1,386*
Average post-reform CARE pension

+ 354.5% vs. 2016
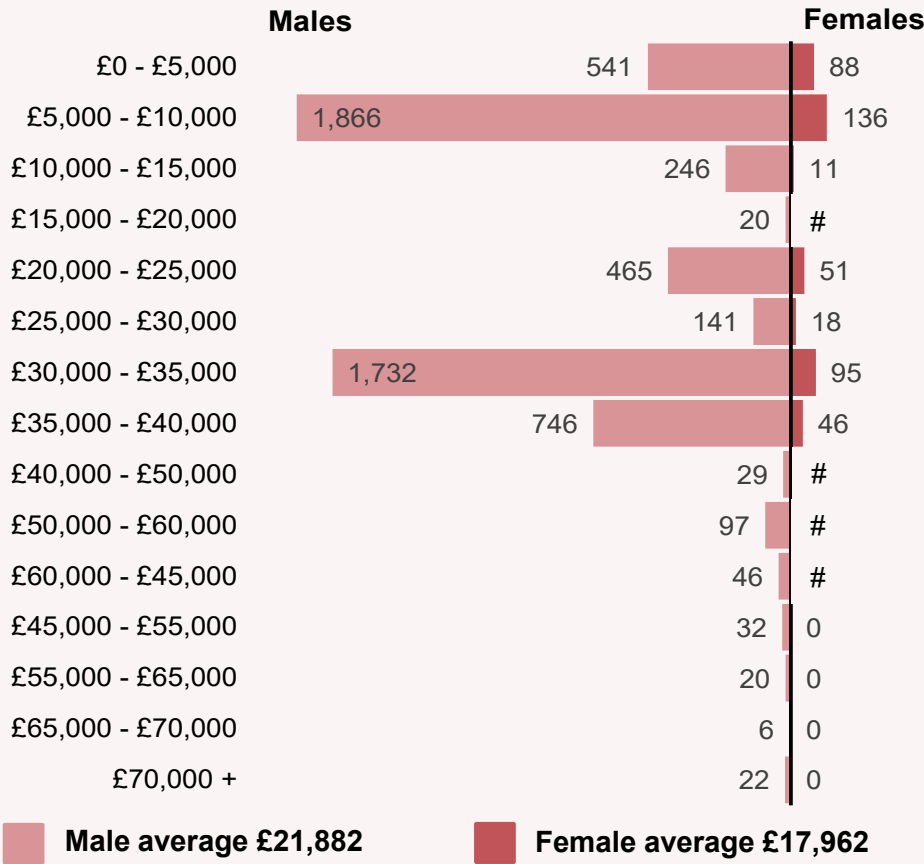
*Average is only for members who have post reform CARE pension
Post reform CARE pension includes pension revaluation to April 2020

Actual pay distribution

	Males	Females
£0 - £5,000	541	88
£5,000 - £10,000	1,866	136
£10,000 - £15,000	246	11
£15,000 - £20,000	20	#
£20,000 - £25,000	465	51
£25,000 - £30,000	141	18
£30,000 - £35,000	1,732	95
£35,000 - £40,000	746	46
£40,000 - £50,000	29	#
£50,000 - £60,000	97	#
£60,000 - £45,000	46	#
£45,000 - £55,000	32	0
£55,000 - £65,000	20	0
£65,000 - £70,000	6	0
£70,000 +	22	0

Male average £21,882   **Female average £17,962**

represents groups of 5 or fewer individuals.

Active membership

As at 31 March 2020

For members with service before 2015, this shows the active members' underline legacy scheme at the valuation date.
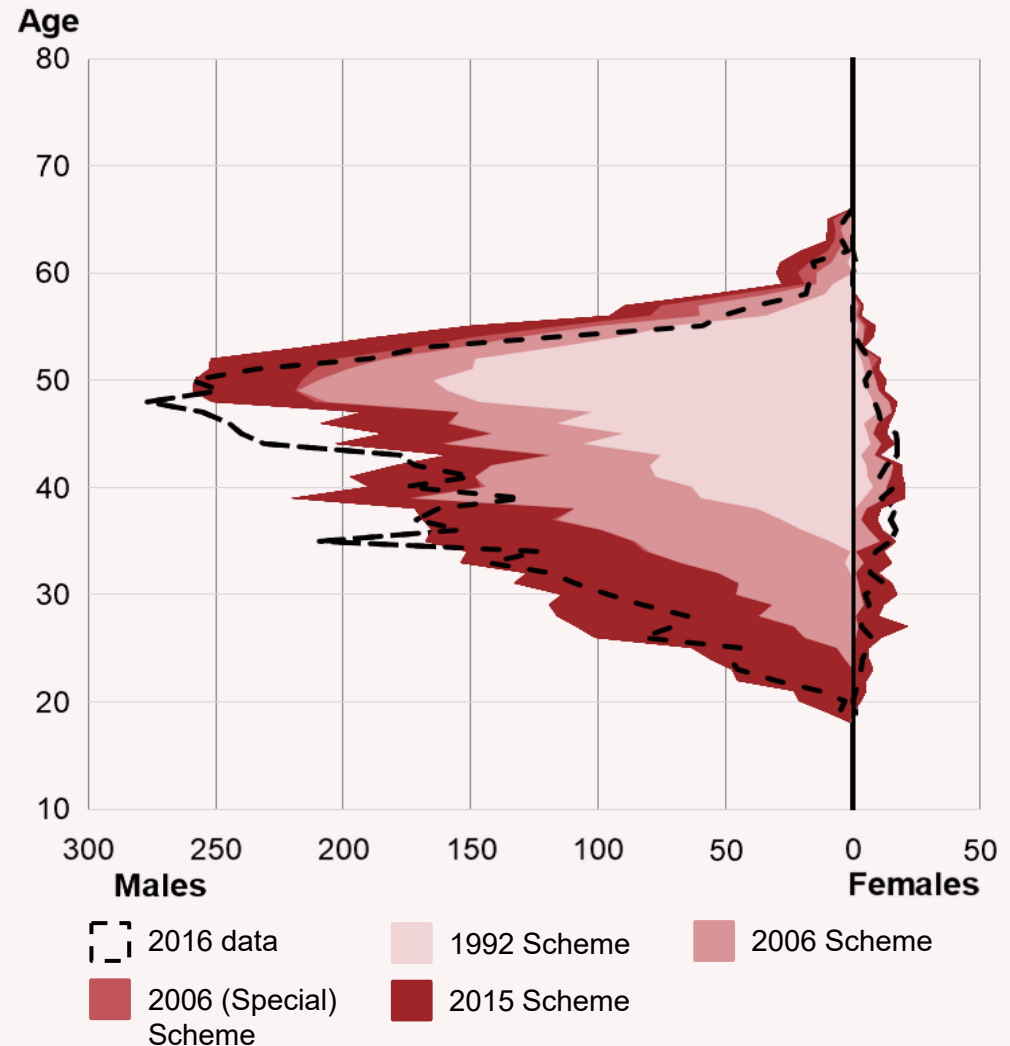
There are significantly more male than female members across all ages.

In general, as you move from younger to older ages:

- The vast majority of younger members are in the 2015 Scheme.

- Between (around) ages 43 and 48, there are more members in 2016 compared with 2020 (as can be seen by the darkest shade of red inside of the dotted line).

- As the membership ages, the proportion of members with legacy scheme membership increases (as shown by the three lighter shades).

From 1 April 2022, all future service will be in the 2015 Scheme.

Where can I see more?

Appendix D – Tables of summary statistics

Membership distribution

Age

⌐⌐⌐ 2016 data	1992 Scheme	2006 Scheme
2006 (Special) Scheme	2015 Scheme	

Deferreds

Deferreds data

As at 31 March 2020

Summary statistics

2,152
Deferred members

+ 41.8% vs. 2016

87 : 13
male : female membership

vs. 87 : 13 in 2016

£5.0m
Total deferred pension

+ 20.6% vs. 2016

48.0 yrs
Average age (weighted by pension)

+1.4 yrs vs. 2016

£2,312
Average pension

- 14.9% vs. 2016

Pension amount includes the April 2020 pension increase

Deferred pension distribution
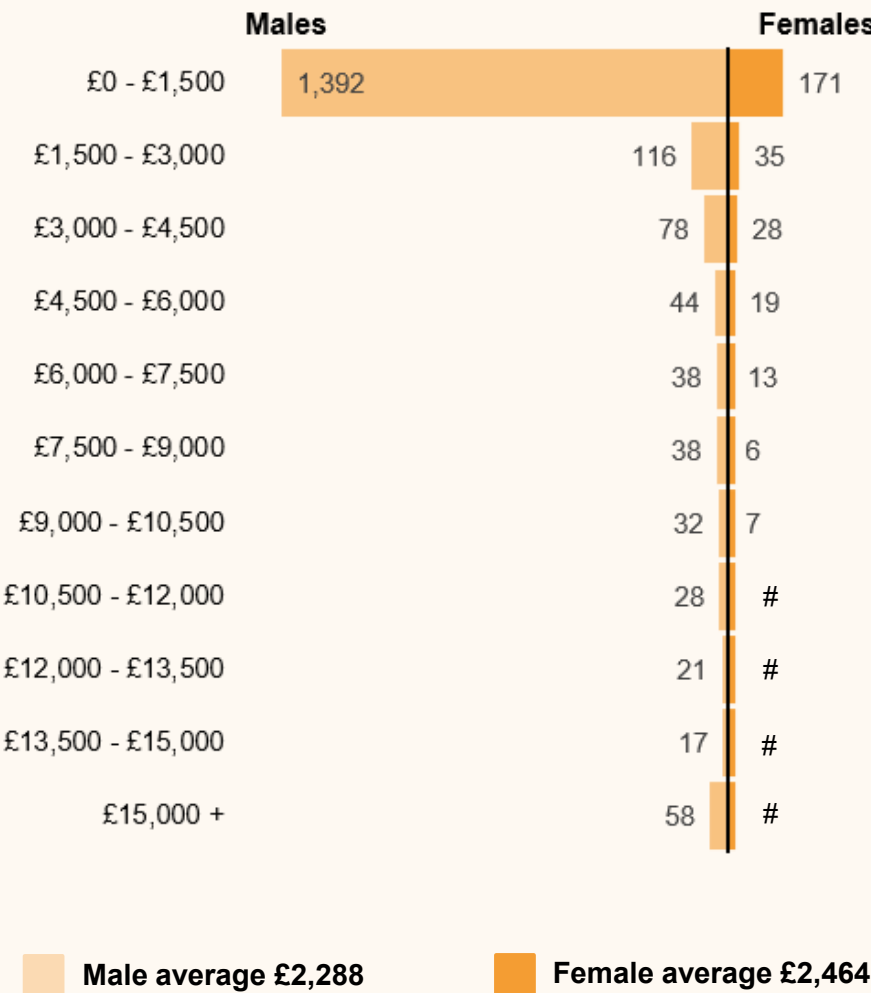
	Males	Females
£0 - £1,500	1,392	171
£1,500 - £3,000	116	35
£3,000 - £4,500	78	28
£4,500 - £6,000	44	19
£6,000 - £7,500	38	13
£7,500 - £9,000	38	6
£9,000 - £10,500	32	7
£10,500 - £12,000	28	#
£12,000 - £13,500	21	#
£13,500 - £15,000	17	#
£15,000 +	58	#

Male average £2,288   Female average £2,464

represents groups of 5 or fewer individuals.

Deferred membership

As at 31 March 2020

For members with service before 2015, this chart shows the members' legacy scheme at the valuation date.

There are more male than female deferred members at all ages, with the majority of members having legacy 2006 Scheme benefits (shown by the two mid-orange shades).
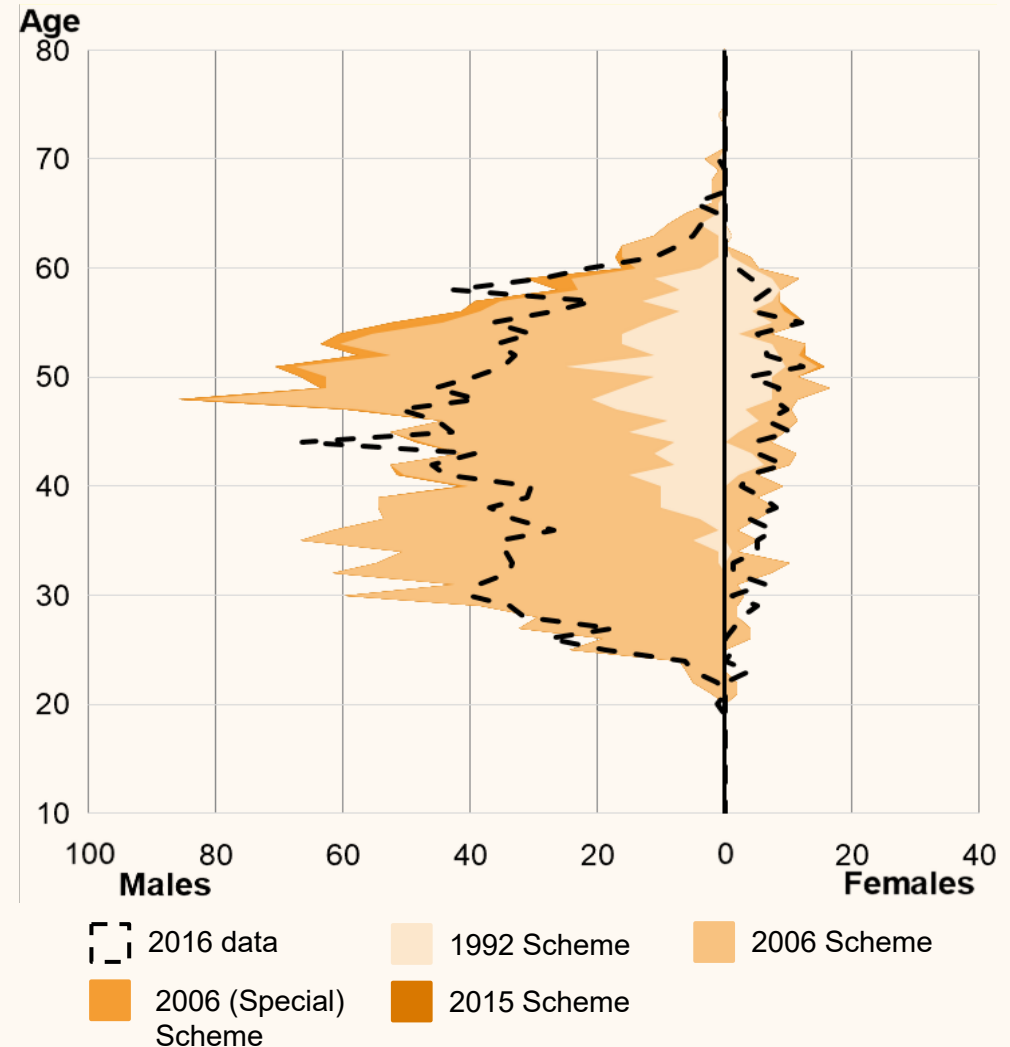
There are more deferred members in 2020 compared to 2016 at most ages (as can be seen by the dotted line inside the shades of orange).

This is a result of increased withdrawals that have been seen over the inter-valuation period, and few deferred members reaching retirement age in the inter-valuation period (further details are shown on pages 24 and 25).

Some deferred members over deferred pension age have not yet claimed the pension that they are entitled to.

There were no 2015 Scheme deferred members in the processed data as at 31 March 2020 (or 31 March 2016). Further details are shown in page 38.

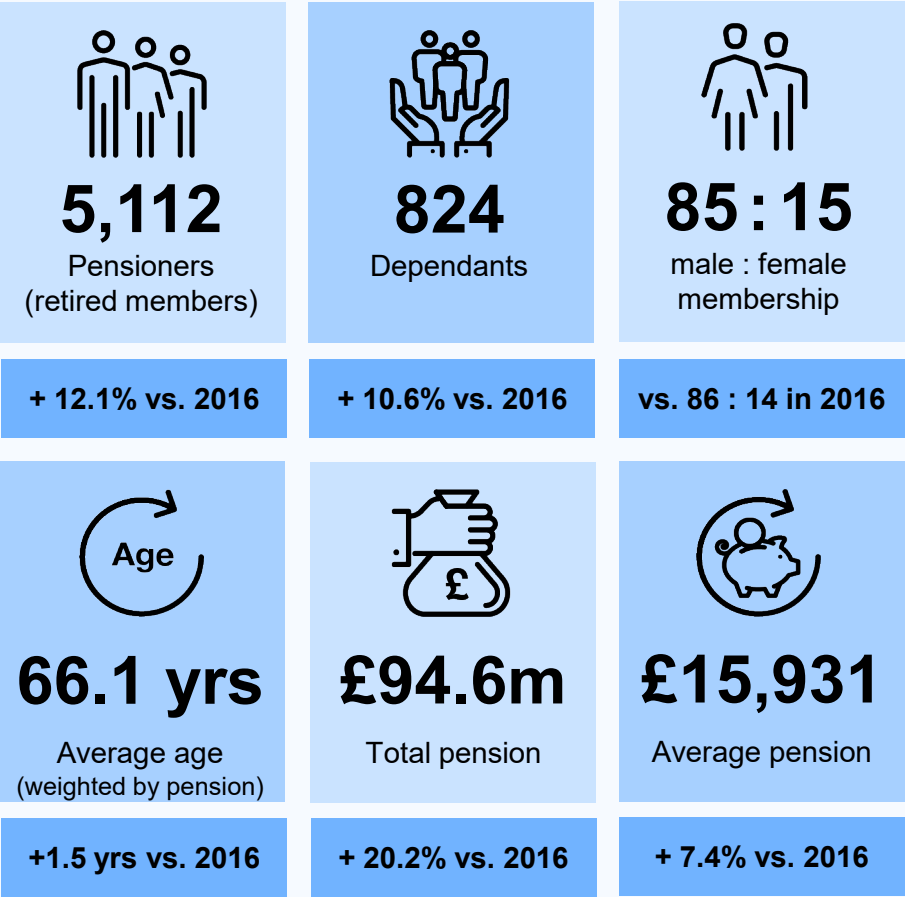## Where can I see more?

Appendix D – Tables of summary statistics

Membership distribution

Legend:
- 2016 data
- 1992 Scheme
- 2006 Scheme
- 2006 (Special) Scheme
- 2015 Scheme

Pensioners

Pensioner data

As at 31 March 2020

Summary statistics

5,112 Pensioners (retired members)	**824** Dependants	**85 : 15** male : female membership
+ 12.1% vs. 2016	+ 10.6% vs. 2016	vs. 86 : 14 in 2016
66.1 yrs Average age (weighted by pension)	**£94.6m** Total pension	**£15,931** Average pension
+1.5 yrs vs. 2016	+ 20.2% vs. 2016	+ 7.4% vs. 2016

Pension amount includes the April 2020 pension increase

Pensioner data pension distribution

	Males	Females
£0 - £5,000	571	229
£5,000 - £10,000	420	324
£10,000 - £15,000	794	214
£15,000 - £20,000	1,992	58
£20,000 - £25,000	577	19
£25,000 - £30,000	269	5
£30,000 - £35,000	240	7
£35,000 - £40,000	92	6
£40,000 - £45,000	39	#
£45,000 - £50,000	15	#
£50,000 +	60	#

Male average £17,117   Female average £8,989
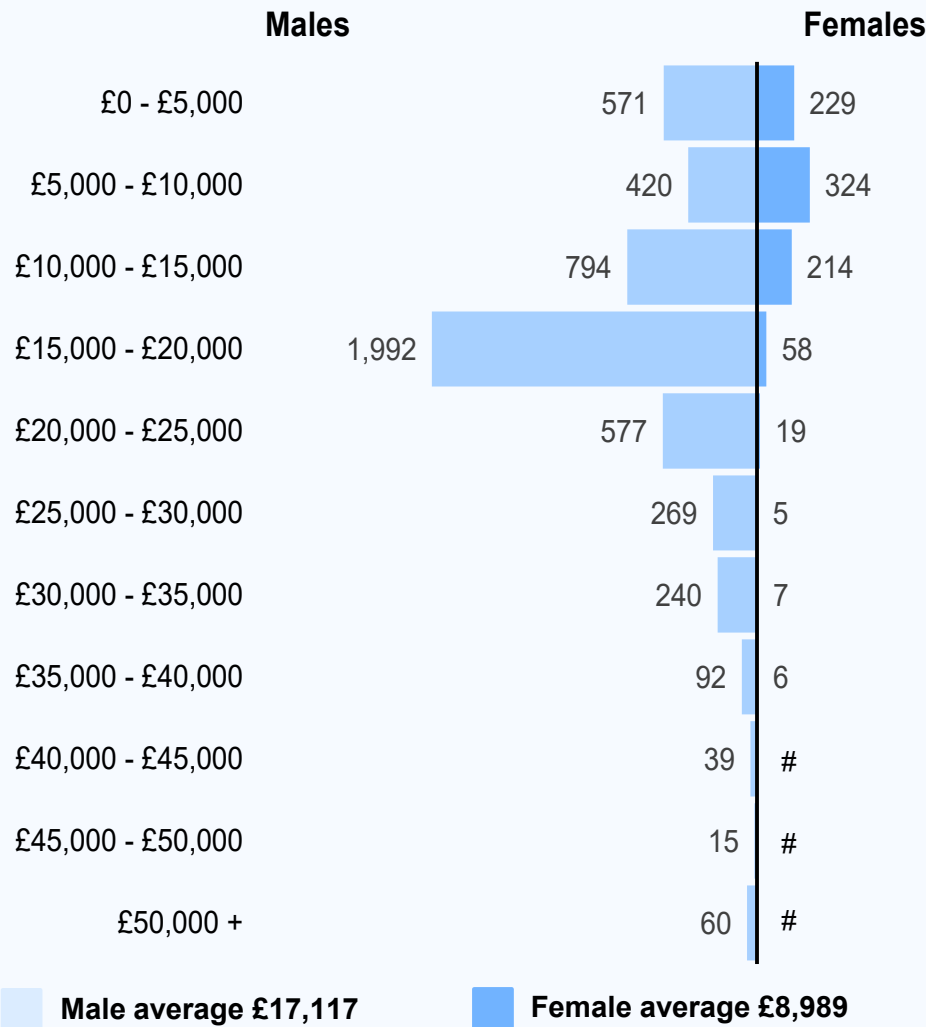
represents groups of 5 or fewer individuals.

Pensioner membership

As at 31 March 2020

There are more male than female pensioners at all ages.

The majority of pensioners are those who retired in normal health (shown by the lightest shade).

There are relatively small groups of male members who retired in ill-health and female dependants.
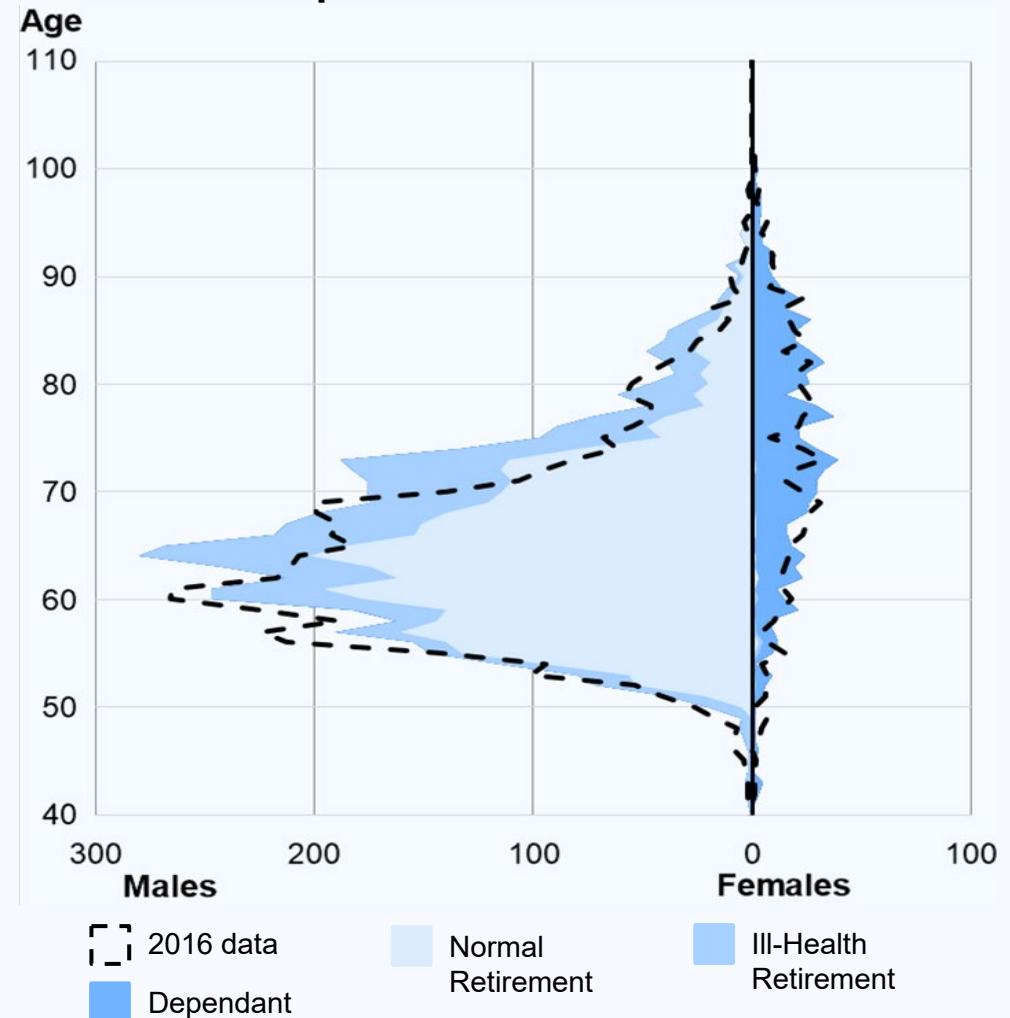
The male dependant population is very small.

Overall, compared with 2016 (shown by the dotted black line), the pensioner population in general has aged.

Where can I see more?

Appendix D – Tables of summary statistics

Membership distribution*

Age

2016 data	
Normal Retirement	Ill-Health Retirement
Dependant	

*This chart does not show members aged below 40 years.

Appendix B

Detailed summaries: Movements data

Membership movements
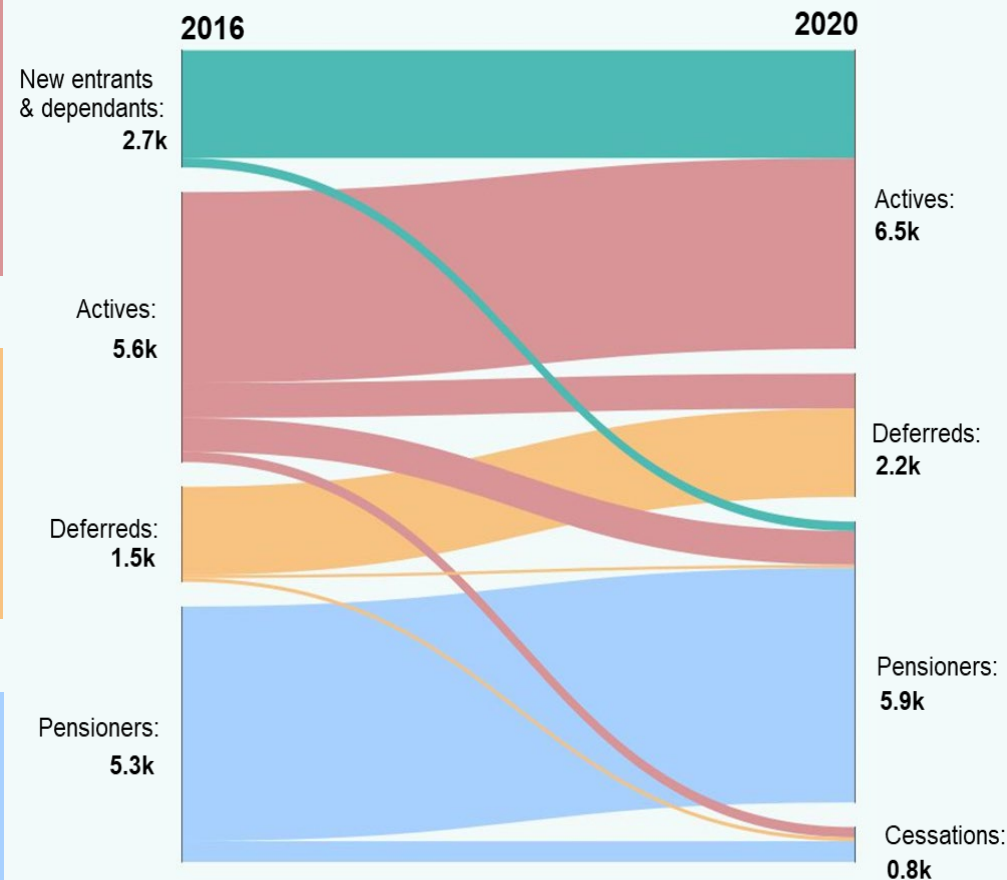**31 March 2016 to 31 March 2020**

Actives

There were more new entrants to active service than the number of movements from active status to deferred or pensioner status, resulting in an increase in the active population since 2016 (see next slide for more information).

Deferreds

There has been a large increase in the deferred population since 2016 (see next slide for more information).

Pensioners

Overall, the number of pensions has grown due to the number of retirements exceeding cessation due to death or otherwise (see next slide for more information).

2016 — 2020

New entrants & dependants: 2.7k

Actives: 5.6k

Deferreds: 1.5k

Pensioners: 5.3k

Actives: 6.5k

Deferreds: 2.2k

Pensioners: 5.9k

Cessations: 0.8k

Membership movements

31 March 2016 to 31 March 2020

This table shows how the number of members in each category has changed over the period 31 March 2016 (top row) to 31 March 2020 (bottom row).

The intermediate rows summarise the membership movements provided over the period, as illustrated in the previous slide.

Reconciliation

The expected number of members in each category at 31 March 2020 is set out in the second last row of the table. This reflects the starting position at 31 March 2016 and the movements data provided.

There are a number of minor differentials between this expected position and the actual position at 31 March 2020.

- Actives: **c220** members
- Deferreds: **-c110** members
- Pensioners: **c30** members.

These differences are within our tolerance levels for a scheme of this size, so no further action needs to be taken.

~0 means the figure is too small to report

| Figures in intermediate rows are rounded to the nearest 10	Actives	Deferreds	Pensioners
Number at start of period:	**5,580**	**1,518**	**5,304**
New members:			
New entrants	2,490	-	-
New dependants	-	-	220
Movements between categories:			
Leavers from active service*	-810	900	-
Re-joiners and re-employed	-	-	-
Age related retirements	-720	-70	800
Ill-health retirements	-60	~0	60
Cessations with no ongoing liability:			
Member deaths	-20	-10	-320
Dependant deaths	-	-	-150
Other exits	-220	-80	-20
Number expected at end of period:	**6,240**	**2,260**	**5,900**
Valuation data at end of period:	**6,462**	**2,152**	**5,936**
Difference:	220	-110	30

*The figure for 'Leavers from active service' in the actives column is calculated based on records of people who have left the actives population with 'deferral' given as the reason for leaving, whereas the corresponding figure in the deferreds column is calculated based on records of people who have entered the deferred population. Although these two calculations should in theory yield the same number, in practice there are inconsistencies between these two datasets as the numbers of members leaving active service may not equal the number of entrants to the deferred populations. The same is true for 'Age related retirements' and 'Ill-health retirements'. In addition, there was an apparent omission of ~80 deferred records in 2016 (more detail on page 30) which we have classified as leavers from active service in the deferreds column. However, the members did not leave the actives population in the inter-valuation period, and so, only contribute to the count of new deferreds and not active leavers.

Appendix C

Checks, adjustments and uncertainties

Checking and adjustment process
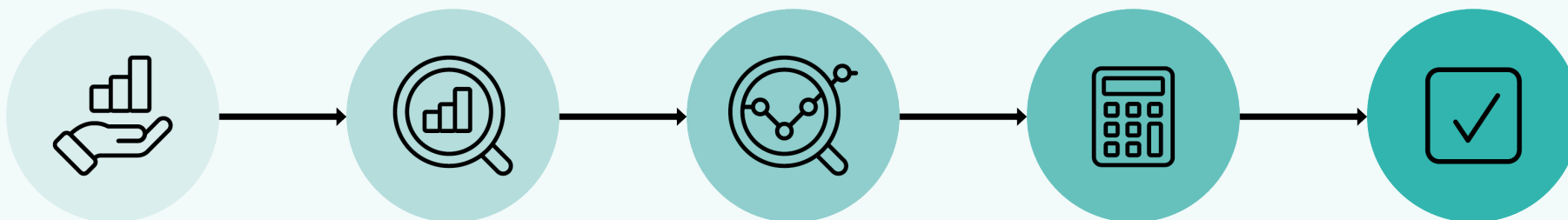
1. Data received

Our work starts when schemes provide data. This is collated and processed to remove any unnecessary personal information and to encrypt any personal information that needs to be retained.

All member data provided and discussed in this report was supplied to GAD by the scheme administrator, SPPA.

2. Aggregate checks and reconciliations

Initial checks carried out on the data are at an overall level, as opposed to an individual record basis.

Any unexpected changes compared to previous datasets are identified.

The data provided is then reconciled against that from a separate source (e.g. scheme resource accounts) to check for any potential issues.

3. 'Record by record' checks and adjustments

If the data passes our initial checks, we then undertake a series of automated, record-by-record checks to remove records that are deemed unreliable. For example, duplicate records, or those with missing key data. Where individual records are excluded, remaining records with similar characteristics are typically rated up to compensate for this, where appropriate.

4. Liability reconciliation

At the final checking stage, we use the adjusted data to calculate actuarial liabilities and reconcile them against those calculated in 2016, adjusted for cashflow information.

5. Final data, ready for use

After completion of checks and adjustments, the dataset is ready for calculating valuation results. We then decide whether, in our opinion, it is fit for the purpose of making decisions based on the valuation results.

If we notice significant issues at any stage of our checking process, we will request new or additional data from the scheme administrator in order to correct or allow for them.

'Record by record' checks and adjustments

Process, limitations & uncertainty

We exclude individual records that have missing or unreliable key data and rate up similar remaining records to replace them, where appropriate.

This process assumes that the membership profile of excluded records is consistent with the profile of the similar reliable records. However, to the extent that this is not the case, there is a degree of uncertainty in the valuation results. Further details are set out in the section of this appendix titled 'Residual Data uncertainty'.

This summary excludes the data used to estimate the additional liabilities in relation to the Matthews options exercise. A separate summary relating specifically to this data is detailed in **Appendix E - Matthews**.

Overall, we believe this is a reasonable approach to take given the scarcity of alternative information.

Top 3 reasons for excluding records*

57	Legacy scheme record with full time equivalent pay not in expected range (rate up applied)
31	Reformed scheme record with actual pay not in expected range (rate up applied)
31	Pensionable service is not in expected range rate up applied)

* Some members may fail more than one exclusion check. Only one exclusion will apply in such cases. As a result, the total number of members failing a check can exceed the number of exclusions.

Summary of excluded records

134	28	2
Actives excluded	Deferreds excluded	Pensioners excluded
2.1%	**1.3%**	**~0.0%**
of total records	of total records	of total records
Improvement vs. the 10.0% 2016 exclusion	**Improvement vs. the 20.2% 2016 exclusion**	**Equivalent vs. the ~0% 2016 exclusion**

Overall, **1.1% of total records were excluded (improvement compared with the 7.0% excluded in 2016).**

~0% means the figure is too small to report

Further information

After finalising our checks and adjustments, we will consider potential data improvements. We will engage with SPPA on any issues we have identified to improve future data submissions, where possible and as appropriate.

Liability reconciliation

Summarised results

At the final data checking stage, we carry out the following reconciliation.

Reconciliation against 2016 valuation results

This step assesses the expected versus calculated value of the scheme's actuarial liability as at 31 March 2020. The expected liability is calculated by adjusting the 2016 liabilities for cashflow information from the scheme's resource accounts, allowing for known pension increases and salary awards since 2016. Differences between expected and calculated liabilities could imply missing or incorrect data.

✓ This check is within our tolerance levels.

Tolerance levels and uncertainty

All reconciliations have a **tolerance level**, within which we accept any differences and move on. Our tolerance levels vary between checks, depending on the level of accuracy we believe appropriate.

If differences fall outside of the acceptable tolerance levels, further investigations are carried out before deciding whether to accept, adjust, or reject the data provided.

Limitations

The results of these checks are heavily dependent on the accuracy and completeness of the information contained in the scheme's published resource accounts as at 31 March 2017, 2018, 2019 and 2020.

If any of this information is materially inaccurate, the results of our checks will also be inaccurate. We believe this is a low risk, as the scheme's accounts have been audited.

Other non-standard adjustments

Summary

In addition, we sometimes make adjustments to data provided to correct known data issues.

We only do this when requested, and when it is more efficient for us to make simple changes than to request new data from administrators.

The key adjustments we have made for FPS (Scotland) are detailed below.

Actives:

- After initial investigations on the data, it was discovered that the scheme administrators, SPPA, provided the average salary over the year for some members and the salary at the valuation date for others. An adjustment was applied to take account of the inconsistent approach to providing salary information.

Deferreds:

- There were some members who were not included in the 2016 valuation data when their membership details would suggest that they should have been. We corresponded with the scheme administrators, SPPA, to confirm that it was correct to include these members.

Pensioners:

- It was discovered that there were a number of members recorded as an 'unknown' pensioner type. Adjustments were made to reassign these members to normal health retirement /ill-health retirement /dependants, depending on age at retirement.

Any non–standard adjustments relating specifically to the data used to estimate the additional liabilities in relation to the Matthews options exercise are detailed in **Appendix E - Matthews**.

Limitations and uncertainty

The extent to which the true data differs from the adjusted data we use in our calculations creates a degree of **uncertainty** in the valuation results. More details are set out in the section of this appendix titled 'residual data uncertainty'.

Residual data uncertainty

Summary

The previous sections of this appendix have described the checks and adjustments made to the data to ensure it is fit for the purpose of calculating valuation results.

However, there are risks that the adjustments we have made do not truly represent the underlying data of the scheme, or that the data provided did not truly represent the underlying data of the scheme and we have not made the necessary adjustments to ensure that it does.

Matthews

The Matthews second option exercise (or 'M2') is a programme to enable certain members to elect to buy historic service in the 2006 (Special) Scheme. At the time of writing, SPPA has consulted on the required changes to the scheme, but the exercise has not yet begun.

It arises because of a November 2018 ruling in a legal case involving part-time judges ('O'Brien v MoJ') that effectively broadened the scope of an earlier ruling in the equivalent case for retained firefighters ('Matthews') and which had previously led to the first Matthews options exercise.

HM Treasury Directions require that all relevant liabilities are included within the valuation. Additional liabilities arising as a result of M2 are considered to be relevant.

More information on this is detailed in **Appendix E - Matthews**.

Potential impact on valuation results

We are comfortable that the checks and adjustments that have been made are reasonable and that the data is appropriate for the purpose of the 2020 valuation. In our opinion, the potential impact of data uncertainty on the employer contribution rate and member outcomes (via the cost control mechanism) is:

Employer contribution rate: The uncertainty will be captured together with other experience and changes through the 2024 (or subsequent) valuations and the impact could be of the order of ± 2% of pensionable pay.

Member Outcomes: No impact expected

The potential impact on the employer contribution rate noted above is largely due to the uncertainty surrounding the data for M2. We anticipate that the uncertainty in the data for the FPS (Scotland) excluding the data for Matthews, would be of the order of ±0.25% of pensionable pay on the employer contribution rate.

☑

After making necessary adjustments detailed in this report, we conclude that the data is appropriate for the purpose of the 2020 FPS (Scotland) valuation.

Appendix D

Tables of summary statistics

Summary statistics – introduction

Categorisation

The membership data in this appendix is categorised by scheme. Where applicable, members are assigned to the legacy scheme that they have already accrued benefits in, even if they have now started to accrue benefits in the reformed scheme. This means that:

- Members who have legacy benefits only as at 31 March 2020 will be categorised under their respective legacy schemes.

- Members who have a combination of legacy and reformed benefits as at 31 March 2020 having transitioned from a legacy to reformed scheme, will be categorised under their respective legacy schemes.

- Members who have reformed benefits only as at 31 March 2020 will be categorised under the reformed scheme.

The summary statistics in this appendix exclude the data used to estimate the additional liabilities in relation to the Matthews options exercise.

A separate data summary relating specifically to Matthews data is detailed in **Appendix E - Matthews**.

Interpretation

The rest of this appendix summarises the scheme data, after adjustments, into a series of tables. An example is shown below.

The first number in each section of the table, in bold text, shows data as at 31 March 2020. The second number, in standard text, shows the change from data as at 31 March 2016 to data as at 31 March 2020.

Positive changes show increases between 2016 and 2020 and negative changes show decreases.

The totals given for summed data may not be exactly the same as the sum of the components shown due to rounding effects.

Example table

Scheme	Males	Females	Total
Legacy scheme 1	**100** +10	**100** +10	**200** +20
Legacy scheme 2	**100** +10	**100** +10	**200** +20
Reformed scheme	**100** +10	**100** +10	**200** +20
All schemes	**300** +30	**300** +30	**600** +60

Summary statistics – actives
As at 31 March 2020

Number of members

Scheme (type of member)	Males	Females	Total
1992 Scheme (Regular)	**1,998** -667	**86** -9	**2,085** -676
2006 Scheme (Regular)	**708** -60	**56** -6	**764** -65
2006 Scheme (Retained)	**1,068** -277	**75** -50	**1,142** -327
2006 Scheme (Special Retained)	**189** -142	**7** +4	**196** -138
2015 Scheme (Regular)	**629** +587	**73** +68	**702** +655
2015 Scheme (Retained)	**1,417** +1,289	**156** +144	**1,573** +1,433
All members	**6,009** +731	**453** +151	**6,462** +882

Average age* (years)

Scheme (type of member)	Males	Females	Total
1992 Scheme (Regular)	**47.7** + 2.1	**45.7** + 3.5	**47.7** + 2.1
2006 Scheme (Regular)	**39.5** + 4.0	**38.2** + 4.2	**39.4** + 4.0
2006 Scheme (Retained)	**43.3** + 3.2	**44.1** + 4.3	**43.3** + 3.2
2006 Scheme (Special Retained)	**55.0** + 6.0	**54.0** + 7.4	**55.0** + 6.0
2015 Scheme (Regular)	**33.5** + 2.3	**32.4** + 2.9	**33.4** + 2.3
2015 Scheme (Retained)	**39.6** + 8.2	**34.7** + 3.8	**39.2** + 7.8
All members	**43.8** + 0.5	**39.7** + 0.6	**43.5** + 0.4

* weighted by actual pay whereas in the 31 March 2016 data report, these were weighted by full time equivalent pay.

The first number in each section, in bold text, shows the value as at 31 March 2020. The second number, in standard text, shows the change from data as at 31 March 2016 to data as at 31 March 2020. Positive changes show increases between 2016 and 2020 and negative changes show decreases.

Summary statistics – actives

As at 31 March 2020

Total full-time equivalent pay* (£m pa)

Scheme (type of member)	Males	Females	Total
1992 Scheme (Regular)	73 - 18.0%	3 - 1.0%	76 - 17.4%
2006 Scheme (Regular)	23 + 3.7%	2 + 4.3%	25 + 3.7%
2006 Scheme (Retained)	35 - 11.6%	2 - 32.8%	37 - 13.4%
2006 Scheme (Special Retained)	6 - 37.6%	~0 + 141.2%	7 - 35.9%
2015 Scheme (Regular)	- -	- -	- -
2015 Scheme (Retained)	- -	- -	- -
All members	138 - 14.7%	7 - 11.6%	145 - 14.5%

Total actual pay (£m pa)

Scheme (type of member)	Males	Females	Total
1992 Scheme (Regular)	73 - 17.9%	3 - 1.0%	76 - 17.4%
2006 Scheme (Regular)	23 + 2.2%	2 + 5.9%	24 + 2.4%
2006 Scheme (Retained)	8 - 17.4%	~0 - 42.9%	8 - 19.5%
2006 Scheme (Special Retained)	2 - 2.2%	~0 + 235.0%	2 + 0.3%
2015 Scheme (Regular)	17 >1000%	2 >1000%	19 >1000%
2015 Scheme (Retained)	9 >1000%	1 >1000%	10 >1000%
All members	131 + 5.7%	8 + 40.9%	140 + 7.2%

*The total full-time equivalent pay is calculated only for those members where the information has been provided (only in respect of members with final salary benefits)

~0 means the figure is too small to report

Summary statistics – actives
As at 31 March 2020

Average full-time equivalent pay* (£ pa)

Scheme (type of member)	Males	Females	Total
1992 Scheme (Regular)	36,752 + 9.4%	35,268 + 9.6%	36,691 + 9.4%
2006 Scheme (Regular)	32,764 + 12.4%	32,077 + 14.7%	32,713 + 12.6%
2006 Scheme (Retained)	32,352 + 11.2%	32,023 + 12.3%	32,331 + 11.4%
2006 Scheme (Special Retained)	34,146 + 9.1%	34,095 + 8.9%	34,145 + 9.1%
2015 Scheme (Regular)	- -	- -	- -
2015 Scheme (Retained)	- -	- -	- -
All members	34,730 + 10.0%	33,354 + 12.5%	34,656 + 10.1%

Average actual pay (£ pa)

Scheme (type of member)	Males	Females	Total
1992 Scheme (Regular)	36,752 + 9.5%	35,268 + 9.6%	36,691 + 9.4%
2006 Scheme (Regular)	32,018 + 10.7%	31,773 + 16.4%	32,000 + 11.1%
2006 Scheme (Retained)	7,088 + 4.0%	6,260 - 4.6%	7,034 + 3.6%
2006 Scheme (Special Retained)	9,600 + 71.1%	9,268 + 51.3%	9,588 + 70.7%
2015 Scheme (Regular)	26,424 + 8.6%	26,676 + 13.6%	26,451 + 9.1%
2015 Scheme (Retained)	6,619 + 18.4%	5,342 - 3.3%	6,493 + 16.2%
All members	21,882 - 7.2%	17,962 - 6.0%	21,607 - 7.4%

*The average full-time equivalent pay is calculated only for those members where the information has been provided (only in respect of members with final salary benefits)

Summary statistics – actives

As at 31 March 2020

Average reckonable service* (years)

Scheme (type of member)	Males	Females	Total
1992 Scheme (Regular)	**18.9** - 0.7	**16.4** + 0.6	**18.8** - 0.7
2006 Scheme (Regular)	**7.0** + 0.5	**5.9** + 0.4	**6.9** + 0.5
2006 Scheme (Retained)	**1.5** - 0.1	**1.2** - 0.1	**1.5** - 0.0
2006 Scheme (Special Retained)	**4.7** + 1.2	**4.8** + 2.1	**4.7** + 1.2
2015 Scheme (Regular)	**-** -	**-** -	**-** -
2015 Scheme (Retained)	**-** -	**-** -	**-** -
All members**	**11.4** - 0.4	**8.3** + 1.2	**11.3** - 0.4

*Unweighted (shown for final salary sections only). These figures are shown as weighted by full time equivalent pensionable pay in the 2016 data report.

**The 2016 valuation data report included the 2015 Scheme in the overall average reckonable service, meaning that differences will not reconcile with the 2016 report.

Total post-reform <u>CARE</u> pension*** (£000's)

Scheme (type of member)	Males	Females	Total
1992 Scheme (Regular)	**3,429** + 558.7%	**202** + 501.8%	**3,632** + 555.3%
2006 Scheme (Regular)	**1,705** + 425.5%	**127** + 426.5%	**1,833** + 425.6%
2006 Scheme (Retained)	**470** + 291.4%	**31** + 191.1%	**502** + 283.2%
2006 Scheme (Special Retained)	**29** + 242.2%	**~0** + 27.3%	**29** + 238.2%
2015 Scheme (Regular)	**692** >1000%	**57** >1000%	**750** >1000%
2015 Scheme (Retained)	**392** >1000%	**33** >1000%	**426** >1000%
All members**	**6,719** + 582.9%	**451** + 553.7%	**7,170** + 581.0%

***Pension amount includes the April 2020 <u>pension revaluation</u>

~0 means the figure is too small to report

Summary statistics – deferreds
As at 31 March 2020

Number of members

Scheme	Males	Females	Total
1992 Scheme	**308** -19	**116** +76	**424** +57
2006 Scheme (Standard)	**1,498** +613	**170** +15	**1,668** +628
2006 Scheme (Special)	**57** -54	**3** -	**60** -51
All members	**1,863** +540	**289** +94	**2,152** +634

There was a small number of 2015 Scheme deferred members as at 31 March 2020, but due to incomplete data, these records were excluded from the final data used in the valuation.

Average age* (years)

Scheme	Males	Females	Total
1992 Scheme	**49.2** + 2.2	**51.6** + 3.3	**49.6** + 2.5
2006 Scheme (Standard)	**42.8** + 1.7	**44.8** - 4.8	**43.0** - 0.6
2006 Scheme (Special)	**54.4** + 0.9	**53.9** -	**54.4** + 0.9
All members	**47.6** + 1.3	**50.4** + 1.5	**48.0** + 1.4

* weighted by pension

The first number in each section, in bold text, shows the value as at 31 March 2020. The second number, in standard text, shows the change from data as at 31 March 2016 to data as at 31 March 2020. Positive changes show increases between 2016 and 2020 and negative changes show decreases.

Summary statistics – deferreds
As at 31 March 2020

Total deferred pension (£000's pa)

Scheme	Males	Females	Total
1992 Scheme	**3,105** + 6.8%	**580** + 144.7%	**3,685** + 17.2%
2006 Scheme (Standard)	**1,102** + 87.9%	**130** - 45.6%*	**1,232** + 49.4%
2006 Scheme (Special)	**57** - 63.1%	**1** -	**58** - 62.5%
All members	**4,264** + 16.9%	**711** + 49.6%	**4,975** + 20.6%

Average deferred pension (£ pa)

Scheme	Males	Females	Total
1992 Scheme	**10,066** + 13.4%	**5,023** - 16.2%	**8,692** + 1.5%
2006 Scheme (Standard)	**736** + 11.0%	**763** - 50.4%	**739** - 6.9%
2006 Scheme (Special)	**1,001** - 28.5%	**331** -	**968** - 30.9%
All members	**2,288** - 17.0%	**2,464** + 0.8%	**2,312** - 14.9%

Pension amounts includes the April 2020 pension increase

*During our analysis of the data, it was discovered that some records which were recorded as females in the 2006 Scheme in the 31 March 2016 valuation data, were now recorded as being in the 1992 Scheme instead. These records have quite high pensions, and so the removal from the 2006 Scheme results in a higher than expected reduction in deferred pension.

Summary statistics – pensioners
As at 31 March 2020

Number of members

Type	Males	Females	Total
Normal Health Retirement	**3,532** +586	**24** +20	**3,556** +606
Ill-Health Retirement	**1,537** - 59	**19** + 6	**1,556** - 53
Dependants*	**1** -	**823** + 79	**824** + 79
All members	**5,070** +527	**866** +105	**5,936** +632

*Includes pension credit members
#Splits not shown for dependants and ill-health pensioners to avoid disclosing information on single individuals.

Average age** (years)

Type	Males	Females	Total
Normal Health Retirement	**64.6** + 1.3	**61.4** - 2.1	**64.6** + 1.2
Ill-Health retirement	# #	# #	**67.9** + 2.4
Dependants*	# #	# #	**73.6** + 1.6
All members	**65.5** + 1.5	**72.9** + 1.2	**66.1** + 1.5

** weighted by pension

The first number in each section, in bold text, shows the value as at 31 March 2020. The second number, in standard text, shows the change from data as at 31 March 2016 to data as at 31 March 2020. Positive changes show increases between 2016 and 2020 and negative changes show decreases.

Summary statistics – pensioners
As at 31 March 2020

Total pension (£m pa)

Type	Males	Females	Total
Normal Health	65,445 + 25.1%	172 + 1,131.7%	65,617 + 25.4%
Ill-health	# #	# #	21,457 + 4.2%
Dependants*	# #	# #	7,494 + 29.6%
All members	86,783 + 19.2%	7,785 + 32.9%	94,568 + 20.2%

Average pension (£ pa)

Type	Males	Females	Total
Normal Health	18,529 + 4.4%	7,148 + 105.3%	18,452 + 4.1%
Ill-health	# #	# #	13,790 + 7.8%
Dependants*	# #	# #	9,095 + 17.1%
All members	17,117 + 6.8%	8,989 + 16.8%	15,931 + 7.4%

Pension amounts includes the April 2020 <u>pension increase</u>
*Includes pension credit members
#Splits not shown for dependants to avoid disclosing information on single individuals

Appendix E

Matthews
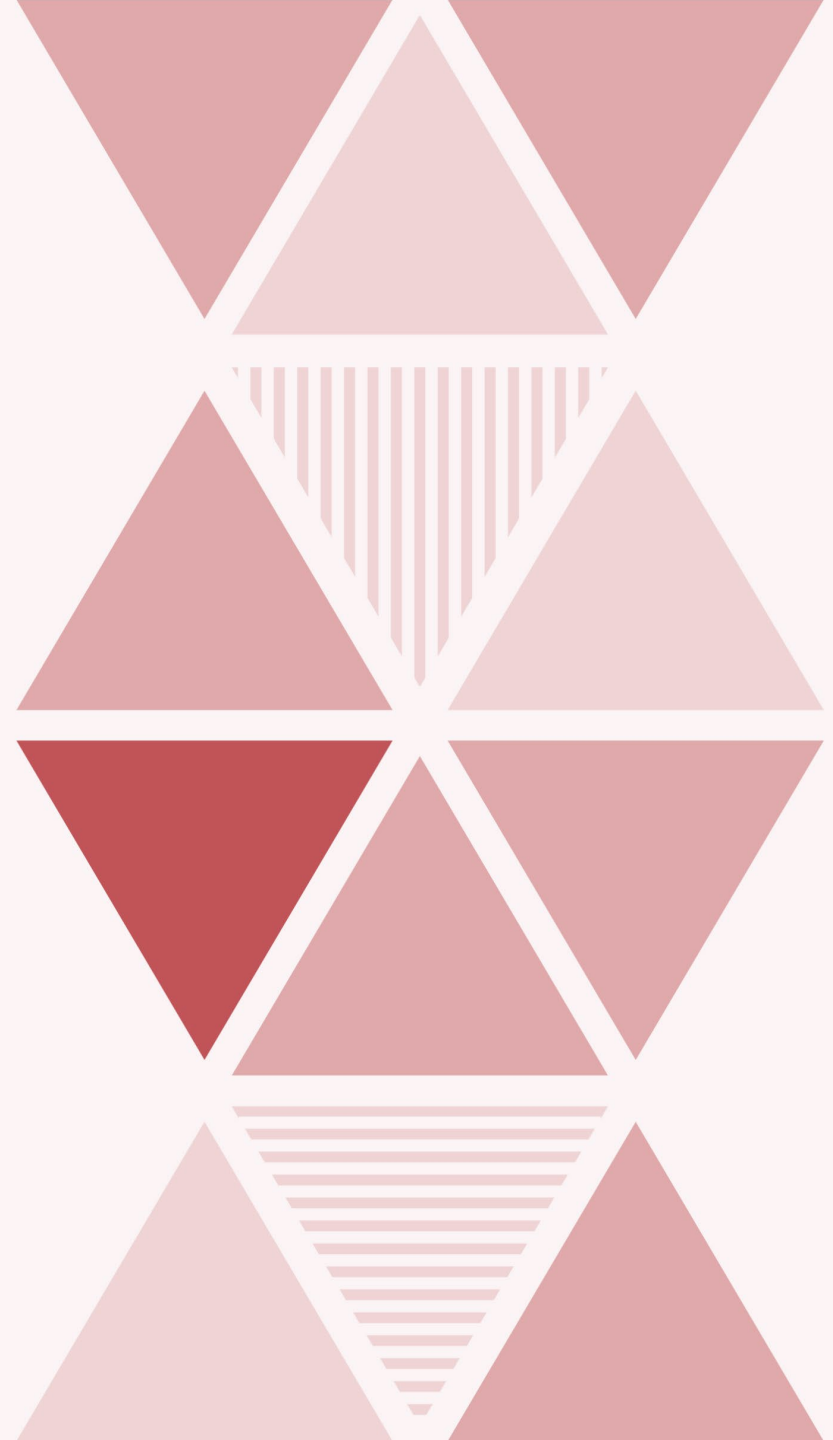
Matthews data

Data provided

The dataset we have been provided with consists of the individual data used by the Scottish Fire & Rescue Service ('SFRS') to administer the first Matthews options exercise ('M1') undertaken during 2014 and 2015.

The data included information about individuals who were eligible to make a choice at M1:

- those scheme members who were still in service at M1.
- those members who had left service before retirement age.
- those members who had already retired.
- those firefighters who did not join the Scheme at any point, but are eligible to be given the opportunity to join the Scheme retrospectively ('non-members').

Of these individuals, those with employment before 1 July 2000 are the main group eligible for M2. There were 2,313 such individuals.

The data had not been updated since M1 to include member's M1 choices. Therefore, we used the valuation membership data to append more recent service dates, scheme section and full-time equivalent pay for firefighters who had joined the Scheme. This combined data was used in the actuarial liability calculations.

Data on these 2,313 eligible firefighters has been summarised in pages 44, 45 and 46.

Checks on data received

We carry out checks to ensure this data is fit for purpose for the valuation. These checks also help us to understand and describe limitations on the valuation results due to data omissions. This is also a professional actuarial requirement. Where our checks show that a data record seems to be unreliable, it is either excluded or adjusted. We do this to make sure the data is appropriate for calculating valuation results.
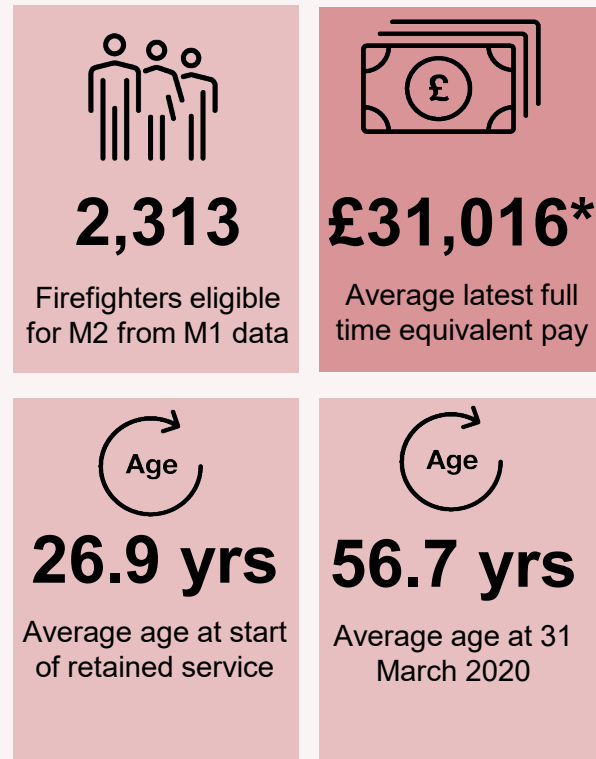
More information on the adjustments we have made in relation to the data are on page 47.
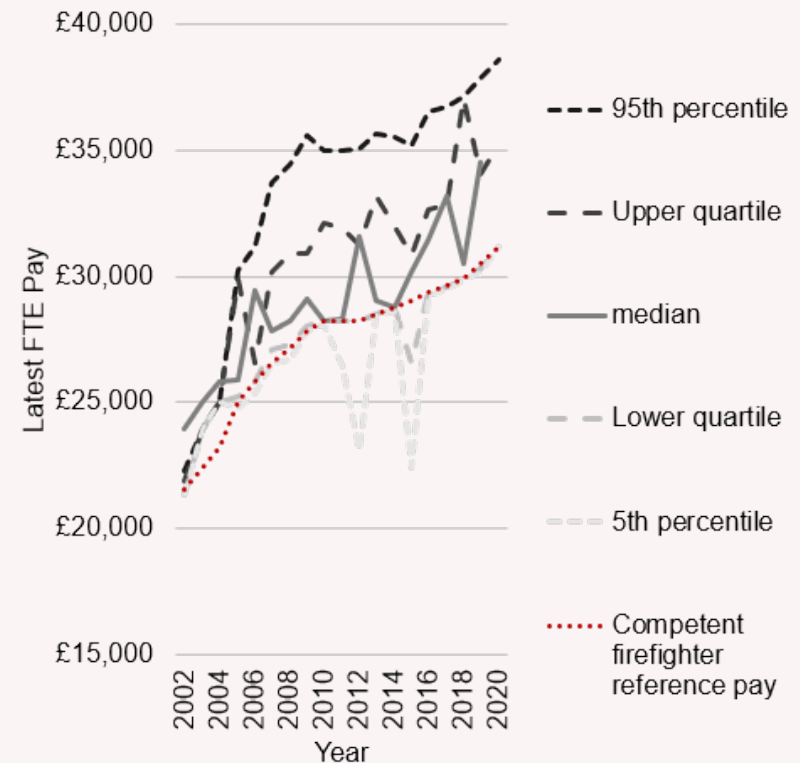
Since members are yet to make their decisions:

- there are no independent sources of data which can be used to validate this data
- overall, the quality of the data is relatively poor by comparison to the Scheme membership data.

Matthews data: summary statistics

Summary statistics**

2,313 Firefighters eligible for M2 from M1 data	**£31,016*** Average latest full time equivalent pay
26.9 yrs Average age at start of retained service	**56.7 yrs** Average age at 31 March 2020

Full time equivalent pay*

*This is the full time equivalent pay from the valuation membership data for the 1,164 firefighters eligible for M2 from the M1 data who had joined the Scheme (at valuation date or date of leaving, whichever is relevant).

** The M1 data did not include consistent information on sex. However, in the context of the Firefighters' scheme, it is not unreasonable to treat all individuals as male.

# Matthews data: employment start date

Employment start dates

The chart to the right shows the distribution of employment dates for the 2,313 eligible firefighters ranges from 1964 to 2000.

The majority of the eligible firefighters have employment start dates in the 1980's and 1990's.

The data shows that the average employment start date for an eligible firefighter is 1990.

Employment start date distribution
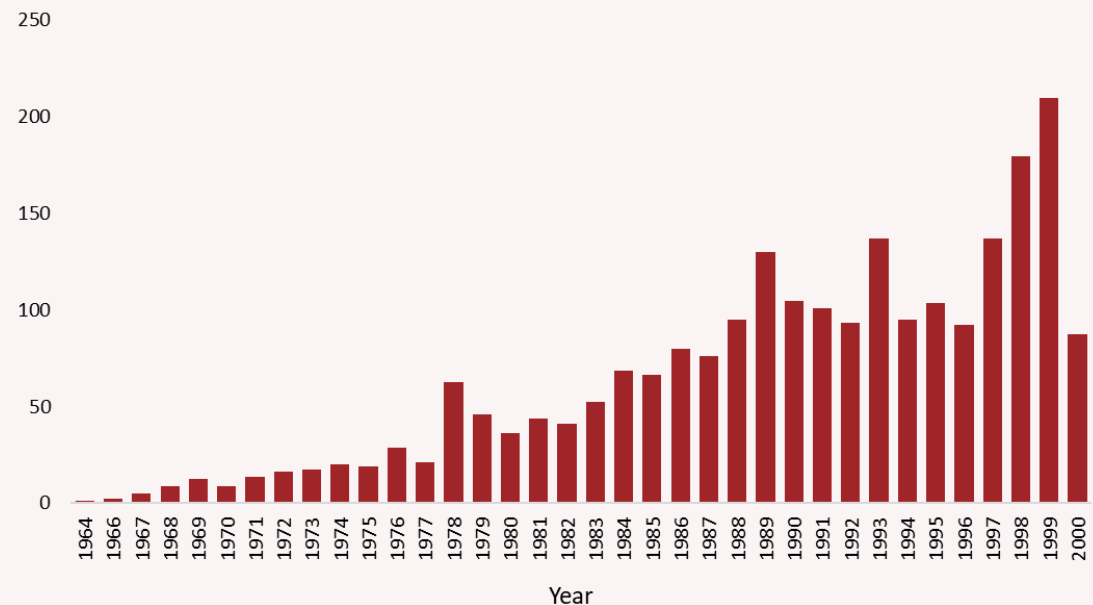
Matthews data: age

Age as at 31 March 2020

The chart to the right shows the distribution of ages as at 31 March 2020 for the firefighters eligible for M2 included in the M1 data (both non-member and members of the Scheme). The M1 optants shown only include those who are eligible for M2.

Of the 2,313 firefighters, 1,164 are included in the valuation membership data. Therefore, we conclude that there are many eligible firefighters who are not currently members of the Scheme (as can be seen by the lighter shade of red on the chart).

The majority of the eligible firefighters are between ages 40 and 70.

The average age for those who opted into M1 is 57 years. This is broadly the same as those who are currently eligible for M2, who have an average age of 57 years.

Age distribution

Legend: M1 Optants — Non-member — Member
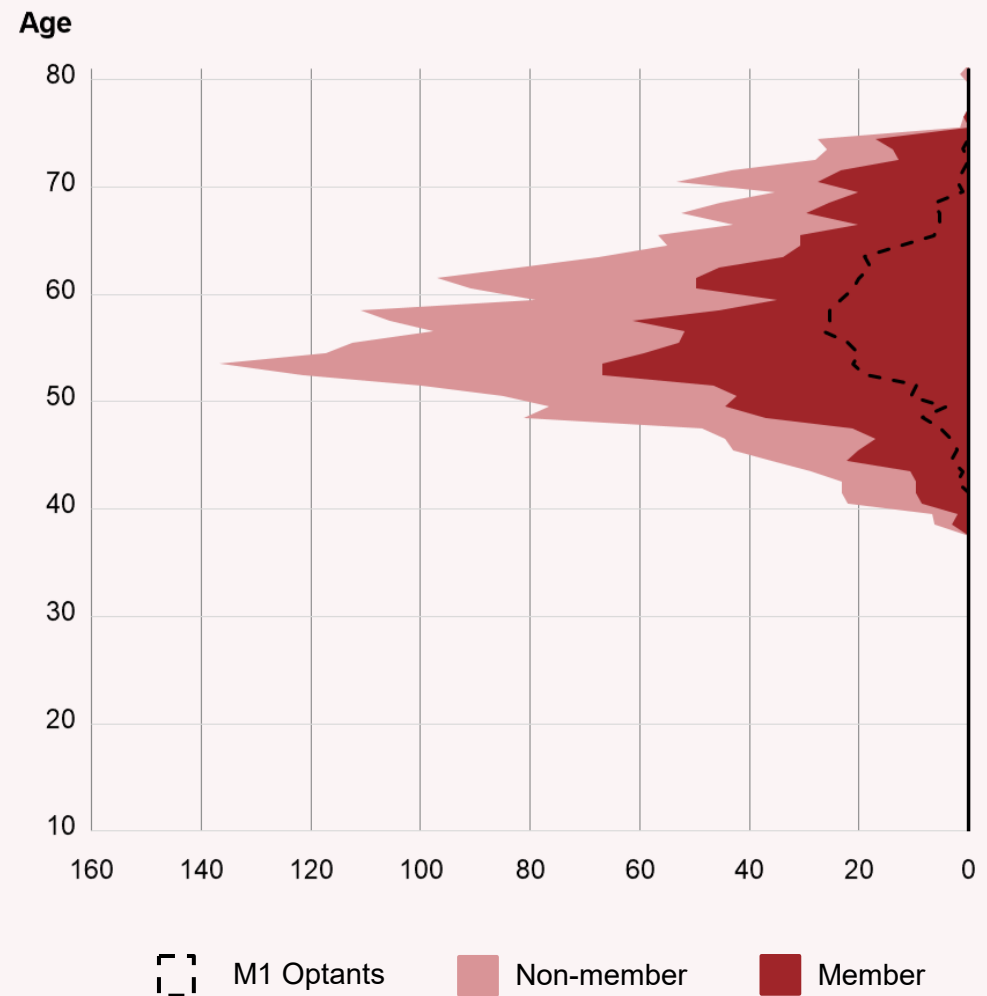
Matthews data: processing and adjustments

Data processing

The M1 dataset was used to split the service prior to joining the scheme or leaving employment that each eligible firefighter has an opportunity to purchase into:

- pre 1 July 2000 service
- 1 July 2000 to 5 April 2006 service and
- post 5 April 2006 service

The numbers of records shown on the diagram on the right is the number of records in each tranche of service. For example, if a firefighter had joined employment prior to 1 July 2000 and left on 1 April 2005, this firefighter would have a record in both the pre 1 July 2000 and 1 July 2000 – 5 April 2006 tranches of service.
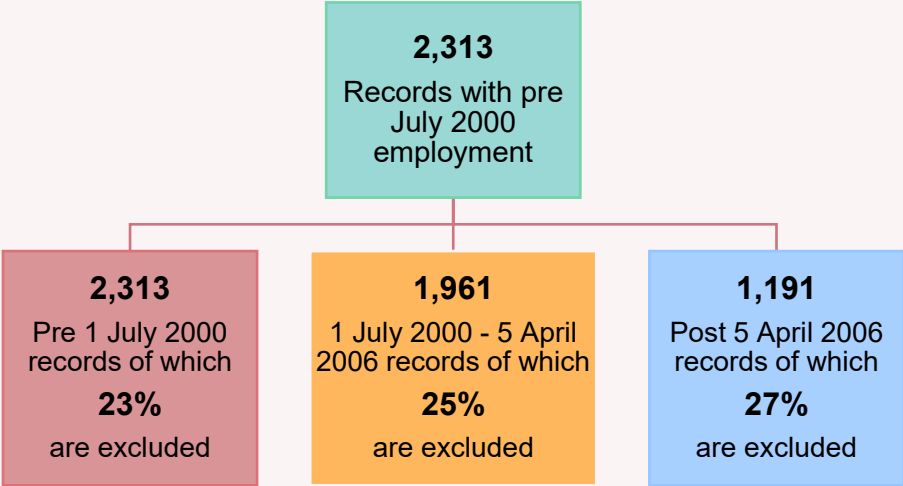
Data adjustments

We exclude individual records that have missing or unreliable key data and rate up similar remaining records to replace them, as appropriate.

This process assumes that the membership profile of the of the eligible firefighters which were excluded because of incomplete or inconsistent data is comparable to the profile of the similar reliable records. However, to the extent that this is not the case, there is a degree of uncertainty in the valuation results.

For those firefighters who appear to not have joined the Scheme at any time, we used competent firefighter reference pay.

Overall, we believe this is a reasonable approach to take given the scarcity of alternative information on the eligible firefighters for M2.

Summary of excluded records

2,313
Records with pre July 2000 employment

| **2,313** Pre 1 July 2000 records of which **23%** are excluded | **1,961** 1 July 2000 - 5 April 2006 records of which **25%** are excluded | **1,191** Post 5 April 2006 records of which **27%** are excluded |

The records in each later tranche are a subset of those for the preceding tranche.

Top 3 reasons for excluding records*

394	Missing date of birth (rate up applied)
81	Actives who are not in the valuation data and who are aged 56 by the time of the exercise (rate up applied)
36	Overlap of records (rate up applied)

* Some members may fail more than one exclusion check. Only one exclusion will apply in such cases. As a result, the total number of members failing a check can exceed the number of exclusions.

Matthews data: impact of data limitations

What limitations exist in the M2 data?

- Some of the data received was incomplete and inconsistent. Exclusions and adjustments were made to the data. This process assumes that the membership profile of excluded records is consistent with the profile of the similar reliable records.

- There are no independent sources of data to verify the dataset received.

Do data limitations cause uncertainty?

Yes. Our checks and adjustments aim to ensure that the data is appropriate for use in valuation calculations. Although reasonable in our view, the dataset adopted may not accurately reflect the true data of those that choose to purchase benefits under M2. This means that there is **residual data uncertainty**.

Matthews data: residual data uncertainty

Is residual data uncertainty a significant issue?

Residual data uncertainty in relation to eligible firefighters could materially affect the valuation results.

With regards to the M2 data, data uncertainty can materially over or underestimate the part of the employer contribution rate which is in respect of the Matthews exercise (5.0% of pensionable pay, as set out in our report titled 'Firefighters' Pension Scheme (Scotland): Valuation Results' dated 26 January 2024).

There is no impact on member outcomes since the additional liabilities associated with the Matthews options exercise are not included in the cost cap cost calculations.

Summary

The previous sections of this appendix have described the checks and adjustments made to the data to ensure it is fit for the purpose of calculating valuation results.

The cost of the benefits bought by members will only be known on conclusion of the options exercise. Data regarding the outcome of the options exercise is expected to be available at the time of the 2024 valuation of the scheme.

It is a requirement of Directions that there is an allowance for a best estimate assessment of the potential liabilities in respect of the Matthews options exercise in the 2020 valuation. This requires us to use a subset of the M1 dataset provided by SPPA.

☑

After making necessary adjustments detailed in this report, we conclude that the M2 data is appropriate for the purpose of estimating the additional M2 actuarial liability in the FPS (Scotland) 2020 valuation.

Any surplus / deficit arising as a result of using this data, will be recovered as part of the 2024 valuation.

Appendix F

Glossary

Glossary

Actuarial liability	The monetary amount assessed, in today's terms, as being required to meet all future payments due in respect of current benefit entitlements. It is dependent on assumptions about future financial conditions and membership changes.
CARE	CARE stands for Career Average Revalued Earnings and refers to a methodology whereby earnings over a member's working lifetime in the scheme are used in the calculation of their benefits in the <u>reformed scheme</u> (referred to as the 2015 Scheme in this report).
Cost cap cost	A way of measuring the cost of benefits being provided from the 2015 Scheme, which is then compared to a 'target cost'. The FPS (Scotland) target cost is set at 15.8% of pay. If the results of the valuation show that the cost cap cost is more than 3% of pensionable pay away from the target cost, and the cost of the scheme still results in a breach once the impact of the economic check is taken into account, changes must be made to the 2015 Scheme (e.g., to the benefits provided) to bring the cost cap cost back to the target cost.
Directions	A document published by HM Treasury and referred to in The Public Service Pensions Act 2013, which sets out the process and requirements for carrying out valuations, including the results which need to be disclosed. Directions were first published in 2014 and have been updated several times since then.
Employer contribution rates	The percentage of scheme members' salaries which the employer is required to pay in order to: • meet the costs of benefits currently being built up by active members • make good any shortfall in the notional amounts set aside to cover benefits already built up. The result is heavily dependent on assumptions about future financial conditions and membership changes.
Matthews	The Matthews second option exercise (or "M2") is a programme to enable certain members to elect to buy historic service in the 2006 (Special) Scheme. M2 is due to begin in early 2024. It arises because of a November 2018 ruling on a legal case involving part-time judges ("O'Brien v MoJ") that effectively broadened the scope of an earlier ruling in the equivalent case for retained firefighters ("Matthews") and which had previously led to the first Matthews options exercise.

Glossary

McCloud	McCloud refers to a legal judgment made in December 2018. The England and Wales Court of Appeal judgment upheld claims of age discrimination brought by some firefighters and members of the judiciary against 'transitional protection' rules. These rules determined the date on which some members would move between reformed and legacy schemes.
Normal pension age	The age at which a member in normal health is entitled to unreduced benefits. This age varies in different schemes: • **1992 Scheme:** Age 55 (or age 50 after completion of 25 years of service); Deferred pension age is 60. • **2006 Scheme (Special):** Age 55; Deferred pension age is 60. • **2006 Scheme:** Age 60 (with early retirement from age 55 subject to benefits being actuarially reduced); Deferred pension age is 65. • **2015 Scheme:** Age 60 (with early retirement from age 55 subject to benefits being actuarially reduced); Deferred pension age equal to State Pension Age ('SPA').
Pension increase	Public service pensions are increased under the provisions of the Pensions (Increase) Act 1971 and Section 59 of the Social Security Pensions Act 1975.
Pension revaluation	The rate at which the CARE pension is revalued each year a member is an active member.
Professional actuarial requirements	The professional requirements that we have complied with when completing this actuarial valuation include: 1. Technical Actuarial Standards: TAS 100 and TAS 300, issued by the FRC. 2. The Actuaries' Code, issued by the Institute and Faculty of Actuaries ('IFoA') 3. The Civil Service Code. GAD is also accredited under the IFoA's Quality Assurance Scheme. More details can be found in our terms of reference.

Glossary

Rate up	A term used to refer to any multiplicative adjustments made to data in order to correct for known issues. For example, if it appears that a group of members have been omitted from the data we've received and salaries are understated by 2% as a result, we might apply a 'rate up' of 2% to the salary data we actually hold as a correction. Although the term 'rate up' implies an increase, we might also 'rate down' if appropriate to do so.
Reformed and legacy Schemes	The reformed Scheme was set up in line with The Public Service Pensions Act 2013, and which came into force on 1 April 2015 (referred to as the 2015 Scheme in this report). All non-reformed Schemes are known as legacy Schemes. This terminology is used in the McCloud judgment.
Regular Firefighter	Regular Firefighters are full-time firefighters.
Retained Firefighter	Retained Firefighters do not work as a firefighter full-time but operate 'on-call' and respond to emergency calls via a pager from their home or place of work at any time of the day or night.
Scheme	The membership data in Appendix D is categorised by Scheme. Members who have legacy and reformed benefits, or legacy only benefits, will be categorised under the legacy schemes. Members who have reformed benefits only will be categorised under the reformed scheme.