Ministry of JUSTICE

Prison Population Projections 2012 – 2018 England and Wales

Ministry of Justice
Statistics Bulletin

Published 1st November 2012

Contents

Key points

This bulletin presents projections of the prison population in England and Wales from November 2012 to December 2018. The prison population projections are based on assumptions about future custodial convictions and incorporate the anticipated impacts of selected policy and procedural initiatives.

The prison population projections are produced using a model of flows of offenders into and out of prison which counts the resulting prison population each month. As part of ongoing work to improve modelling and forecasting across the Ministry of Justice, the model used to generate the custodial population projections has been revised and improved.

Three projected scenarios have been modelled. They track the impact of three different sentencing trends on custodial convictions, custodial sentence length and hence on the resulting prison population. They correspond to (though do not use the same assumptions as) the “lower”, “medium” and “higher” scenarios used in the 2011 projections. Other impacts included in the projections, such as those of changing legislation, changing procedures and new sentencing guidelines are applied equally to all three scenarios.

The projected prison populations under each scenario are given in Table 1. By the end of June 2018, the prison population is projected to be 80,300 in the Scenario 1 projection, 85,600 in the Scenario 2 projection and 90,900 in the Scenario 3 projection.

Table 1: Projected prison population (end June Figures)

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Jun-13	83,000	84,600	86,500
Jun-14	81,900	84,300	86,900
Jun-15	80,900	84,400	88,100
Jun-16	80,300	84,700	89,200
Jun-17	80,400	85,300	90,300
Jun-18	80,300	85,600	90,900

The assumptions informing these projections, and therefore the projections themselves, are subject to significant uncertainty. This is represented by the three scenarios, with each scenario being only as likely as the assumptions which inform it. Indeed, the 2012 Scenario 2 projection is lower than last year’s medium projection largely due to the decline in court disposals seen in the financial year 2011/2012 and the introduction of the Legal Aid, Sentencing and Punishment of Offenders Act which achieved Royal Assent in May 2012.

The assumptions used are based on extensive consultation (see Appendix D for a list of those consulted), and observed data trends. A comparison between projected and actual prison population for September 2012 is given, but this publication does not anticipate which of the modelled scenarios is most likely to occur in the future.

1. Introduction

This bulletin presents prison population projections for England and Wales from November 2012 to December 2018. The projections are produced to aid development, capacity planning and resource allocation within the Criminal Justice System (CJS) and the National Offender Management Service (NOMS). The latest published useable operational capacity (26th October 2012) is 91,054[1].

Three projections of the prison population have been agreed through a consultative process. These projections track the impact of three different trends in sentencing on custodial convictions, custodial sentence length and hence on the resulting prison population. These scenarios also take into account drivers which impact equally on each scenario:

- trends in the age, gender and offence of defendants entering the system and in the flow of cases through the courts;
- views of future parole hearing frequency and expected outcomes for indeterminate (Life and Indeterminate for the Public Protection) sentences; and
- the impact of the Legal Aid, Sentencing and Punishment of Offenders Act which achieved Royal Assent in May 2012.

As part of wider work to develop a consistent and coherent suite of models of the criminal courts and offender management, driven by common projections of demand for the Ministry of Justice's services, the model used to generate this year's prison population projections has been revised and improved.

The custodial convictions model uses projections of numbers of defendants entering the criminal courts and takes into account:

- the age, gender and offence of defendants entering the system;
- the flow of cases through the courts; and
- the sentences which concluded cases attract,

in order to project volumes of defendants being given a custodial sentence.

The prison population projections model, which has been revised since 2011 to operate at a lower level of granularity, takes projections of custodial convictions, converts them to projections of prison receptions and then models

[1] www.justice.gov.uk/statistics/prisons-and-probation/prison-population-figures

the amount of time that offenders spend in prison to calculate the resulting prison population.

The benefits of this method are that it allows us to:

- explicitly project custodial convictions (rather than just convictions);
- understand the Criminal Justice System factors which contribute to change in the prison population, be they time served, sentences given, trial and sentencing court changes or shifts in defendant demographics; and
- more easily model the impact on the prison population of specific Ministry of Justice and other Criminal Justice Agency policy changes relating to specific offences or specific sentences.

Appendix C provides details of the methods used to produce the prison population projections and the assumptions behind them.

2. Prison population June 2011 to June 2012

The use of immediate custody (as opposed to other disposal options) and the average custodial sentence length are two major factors that influence the future prison population. The "Story of the Prison Population 1995 – 2009" - a Ministry of Justice publication - addresses the changes in the prison population since 1995[2] and explains how these two factors, combined with key legislative and policy changes, influenced the prison population over this period. Tougher sentencing and enforcement outcomes and a more serious mix of offence groups coming before the court were the two main factors that caused the 66 per cent increase in the prison population over this period.

From June 2009 to June 2012, the prison population continued to rise at a rate of less than 1 per cent per year, allowing for the extra 1,200 growth attributed to the impact of the withdrawal of End of Custody Licence (ECL)[3] in 2010.

Table 2 summarises these changes.

Table 2: Population in custody changes from 2004 to 2012

	Offender Management Statistics		Year on year % difference
	Start of Year	End of Year	
June 2004 to June 2005	74,488	76,190	2.3%
June 2005 to June 2006	76,190	77,982	2.4%
June 2006 to June 2007	77,982	79,734	2.2%
June 2007 to June 2008	79,734	83,194	4.3%
June 2008 to June 2009	83,194	83,454	0.3%
June 2009 to June 2010	83,454	85,002	1.9%
June 2010 to June 2011	85,002	85,374	0.4%
June 2011 to June 2012	85,374	86,048	0.8%

[2] Story of the Prison Population: www.justice.gov.uk/statistics/prisons-and-probation/prison-population-1995-2009

[3] www.justice.gov.uk/downloads/guidance/prison-probation-and-rehabilitation/psipso/psi_2010_15_ending_of_end_of_custody_licence_scheme.doc. Note that if ECL had continued, growth from June 2009 to June 2010 would have been at a similar rate to that seen from June 2008 to June 2009 (0.4 per cent).

3. Modelling methodology and projection scenarios

The method used for generating projections of the prison population in England and Wales has been revised and improved for the 2012-2018 projections.

At the core of the method is a model of flows of offenders into and out of prison which counts the resulting prison population each month for sentenced, recall and remand prisoners. This model has been revised to operate at a lower level of granularity than the model used in 2011.

Inputs to the prison projections model include projections of future custodial convictions. These are generated from time series projections of numbers of defendants entering the criminal courts and take into account the age, gender and offence of defendants entering the system, the flow of cases through the courts and the sentences which concluded cases attract.

The prison projections model monitors the sizes of the sentenced, recall and remand prison populations. These populations depend on the inflows defined above and the outflows. These outflows are defined by observed distributions of custodial sentence lengths, and percentage of custodial sentence served for subsets of these populations. The model also simulates the aging of the prison population over time.

For this publication, the results of the prison projections model are supplemented with an estimate of the future non-criminal and fine defaulter populations, which is based on the average of published data from January to June 2012.

The projection model is based on data up to May 2012 from various sources including court proceedings and performance data, sentencing data and prison receptions and population data.

Three projected scenarios have been modelled as shown in Tables 3a and 3b. These scenarios track the impact of three different incremental changes in sentencing behaviour up to March 2015, where the scenario changes are flat-lined:

- The Scenario 1 projection assumes that recent decreasing trends in receipts to courts double, and disposals will fall in line with these trends. The average length of sentence also decreases following a reversal of current observed trends.

- The Scenario 2 projection assumes that recent trends in receipts will continue and disposals will stay constant with the previous year (April 2011 - March 2012). The average length of sentence remains consistent with that seen in the previous 15 months.

- The Scenario 3 projection assumes that the recent decreasing trends will be reversed going forward, and disposals will rise in line in this change. The average length of sentence also increases following current observed trends.

The three projected scenarios also incorporate the impact of:

- trends in the age, gender and offence of defendants entering the system and in the flow of cases through the courts;
- views of future parole hearing frequency and expected outcomes for indeterminate sentences; and
- the impact of the Legal Aid, Sentencing and Punishment of Offenders Act which achieved Royal Assent in May 2012.

The scenarios modelled are not predictions of what will happen to the prison population, but rather indications of what the prison population would look like if scenario conditions were to be fulfilled. The scenarios do not represent bounds on our projections of the prison population.

Table 3a: Prison projection scenarios – average change in custodial convictions, by demographic group, due to demographic and court route trends, for the Scenario 2 projection

	Average year on year percentage change in custodial convictions 2012 - 2015					
	21 years and over		18-20 years		Less than 18 years	
Sentencing Trends	Male	Female	Male	Female	Male	Female
Scenario 2	0%	0%	1%	-1%	-1%	-2%

Table 3b: Additional changes in custodial convictions and custodial sentence length due to sentencing trends for the projections

	Average year on year percentage change in custodial convictions from Scenario 2						Year on year percentage change in average custodial sentence length from Scenario 2
	21 years and over		18-20 years		Less than 18 years		
Sentencing Trends	Male	Female	Male	Female	Male	Female	
Scenario 1	-2%	-2%	-1%	-1%	-5%	-4%	-2%
Scenario 2	0%	0%	0%	0%	0%	0%	0%
Scenario 3	2%	2%	1%	1%	5%	4%	2%

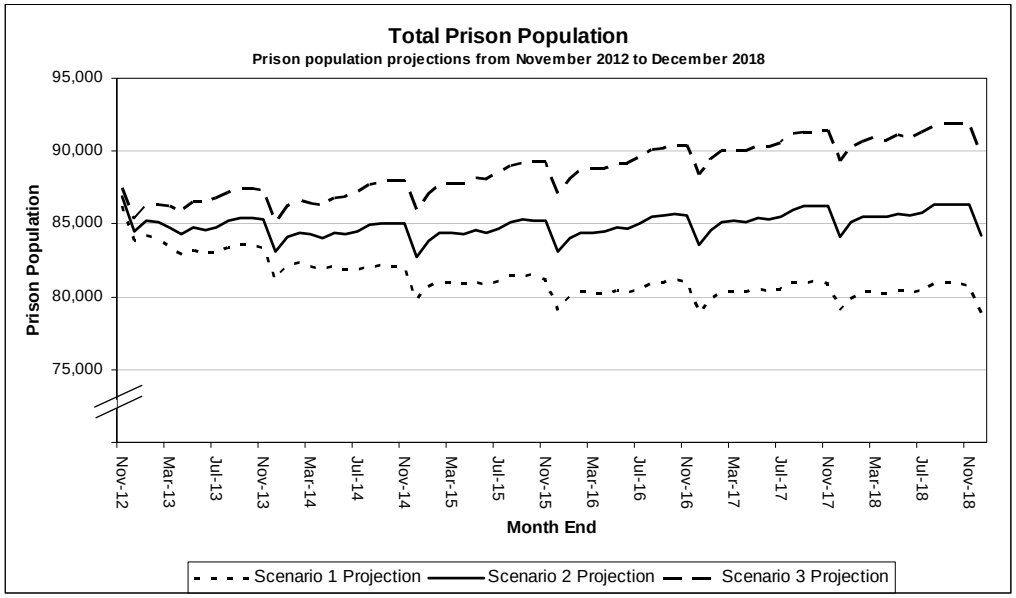
The modelling methodology, projection scenarios and assumptions used are described in detail in Appendix C.

4. Results

The Scenario 1 projection estimates that the prison population will fall to 83,000 by the end of June 2013 and to 80,300 by the end of June 2018. The Scenario 2 projection estimates that the prison population will fall to 84,600 by the end of June 2013 and subsequently rise to 85,600 by the end of June 2018. The Scenario 3 projection estimates that the prison population will remain steady at 86,500 to the end of June 2013 and rise to 90,900 by the end of June 2018. Chart 1 presents the projected scenarios to show changes in the prison population from November 2012.

Appendix A contains tables for annual projected end of June populations, average financial year populations and total monthly populations for each scenario. Sub-population figures are given for: determinate sentences; indeterminate sentences; remand; recalls; non-criminals; fine defaulters; 15-17 year olds; females 18 and over; males 18-20 and males 21 and over (determinates, indeterminates, recalls and remand).

Chart 1: Projected monthly prison population (all scenarios)



The projected trends reflect the cumulative impacts of the various circumstantial, sentencing, legislative and procedural assumptions that are used to generate the projections. The seasonal pattern reflects the dip in the prison population which is always seen around the Christmas period.

In the Scenario 2 projection, the prison population is expected to fall to 84,600 by June 2013, due to the introduction of the Legal Aid, Sentencing and Punishment of Offenders Act, many of the August 2011 public disorder population completing their sentences, and the decrease in court disposals

seen in the financial year 2011/12. The projected population in this scenario is then expected to fall 0.4 per cent by June 2014, before gradually increasing (between 0.1 and 0.7 per cent year on year) until 2018. The projected decrease seen to 2014 is primarily driven by the continued effect of the Legal Aid, Sentencing and Punishment of Offenders Act. Projected increases seen after 2014 are the result of the longer term determinate population (4+ years) increasing. It should be noted that the Legal Aid, Sentencing and Punishment of Offenders Act will cause those that would have received an Imprisonment for Public Protection (IPP) sentence to now receive a determinate sentence. This will create a shift from the indeterminate population to the determinate population, which affects all three scenarios.

In the Scenario 1 projection, the prison population is expected to fall to 83,000 by June 2013. The projected prison population in this scenario is then expected to fall (between 0.1 and 1.3 per cent year on year) to 2018 with the exception of a slight increase in 2017. This decrease can be attributed to a projected decrease in the number of immediate custodial convictions and shorter custodial sentence lengths under this scenario, as well as the introduction of the Legal Aid, Sentencing and Punishment of Offenders Act. In the short term it will also fall due to many of the August 2011 public disorder population completing their sentences.

In the Scenario 3 projection, the prison population in this scenario is expected to be at 86,500 until June 2013 and then expected to grow each year (between 0.5 and 1.4 per cent). These rises are the result of increases in the level of custodial sentences and the increase in custodial sentence length under this scenario, although this is moderated by the downward effects of the Legal Aid, Sentencing and Punishment of Offenders Act and many of the August 2011 public disorder population completing their sentences

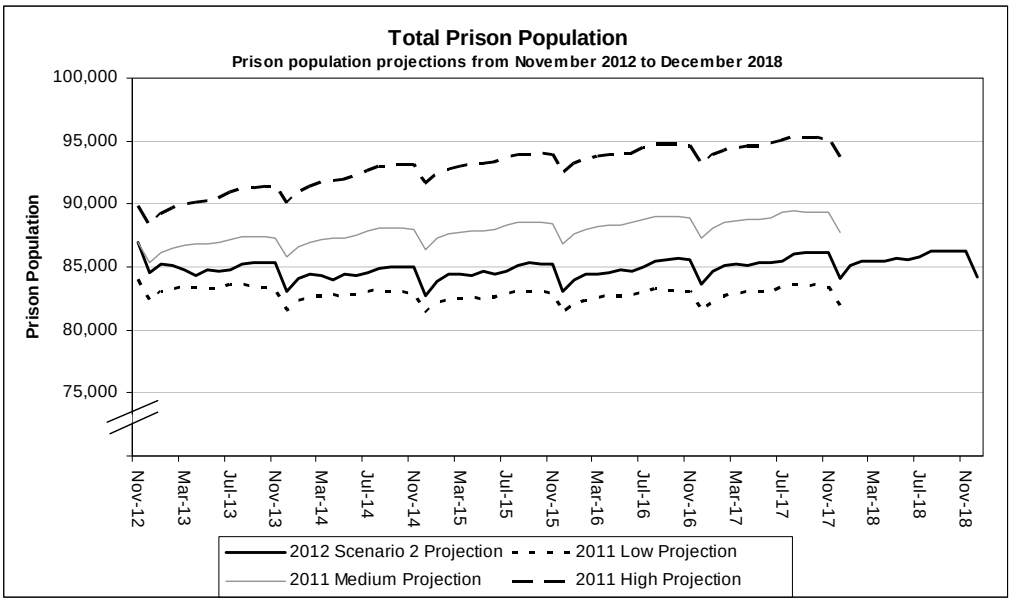
At the end of September 2012 the published prison population was within 1.1 per cent of the Scenario 2 projection, and within 0.5 per cent of the Scenario 1 projection. Most of this deviation is located in the projected remand population, which accounts for 0.9 per cent of the 1.1 per cent difference in Scenario 2. This does not necessarily mean the prison population will track against either the Scenario 2 or Scenario 1 projection going forward.

Differences could be explained by changes, different to those projected, in overall demand, offence mix, age and gender of defendants, court routes, custody rates or sentence lengths. A discussion of the extent to which the actual prison sub-populations have tracked the Scenario 2 projection can be found in Appendix B.

Chart 2 plots the 2012 Scenario 2 projection against the three 2011 prison population projections. The 2012-2018 Scenario 2 projection is consistent with the 2011 “medium” projection at the November 2012 point, but does not track its rise. Going forward the Scenario 2 projection sits between the 2011 ‘lower’ and ‘medium’ projections. A comparison of end of June figures from the 2011 and 2012 projections can be found in Appendix A. The lower level of the new projections can be attributed to a decrease in the number of custodial

convictions in 2012 and the introduction of the Legal Aid, Sentencing and Punishment of Offenders Act.

Chart 2: Comparing 2011 and 2012 projections (November 2012 – December 2018)



5. Caveats on prison population projections

The projections presented here are a set of scenarios which reflect the impact of three possible trends in sentencing, combined with trends in the age, gender and offence of defendants entering the system and in the flow of defendants through the courts. The impacts of changes to legislation and guidance which took place before June 2012 and views of future parole hearing frequency and outcomes for indeterminate sentence prisoners have also been taken into account.

The projections do not reflect the impact of legislative, policy, operational or procedural change or guidance for which there is no definite timetable for implementation. The projections therefore provide a set of "baseline" scenarios against which the impacts of future changes can be assessed.

Even without these possible changes, the actual future prison population may not match any of the projected scenarios. Changes to criminal justice processes could influence the numbers of offenders being brought to the point of sentence or the way that offenders are managed. Changes to sentencing behaviour may also be different from those modelled. Finally, both sentencing behaviour and criminal justice processes, as well as policy decisions, can respond to a multitude of environmental factors which cannot be anticipated, such as high profile criminal cases, events like the August 2011 public disorder events, and public debate.

Other impacts included in the projections (such as changing legislation, changing procedures and new sentencing guidelines) are applied equally to all three scenarios.

Assumptions for modelling and scenario development were captured through a consultative process that included all major stakeholders (see Appendix D). The assumptions are based on analysis (where reliable data are available) and on expert judgement from policy makers, key deliverers and system influencers. The assumptions are therefore likely to be more robust for those measures and processes that have a well-defined boundary than for those that do not. For the total prison population, the Scenario 2 projection for September 2012 is within 1.1 per cent of published data[4].

[4] www.justice.gov.uk/publications/statistics-and-data/prisons-and-probation/oms-quarterly.htm

Data used in the model have been derived from various sources, including court proceedings and performance data, sentencing data and prison receptions, and population data. Due to technical problems relating to the supply of data for statistical purposes, some of these data were unavailable from July 2009 to February 2010 and others from July 2009 onwards. This means certain data has been estimated by extrapolating between past and current data and other data has been estimated from headline totals which were unaffected by these problems.

Appendix A: Additional tables[5]

Annual tables of overall projected prison population

Table A1: Projected prison population (end of June figures)

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Jun-13	83,000	84,600	86,500
Jun-14	81,900	84,300	86,900
Jun-15	80,900	84,400	88,100
Jun-16	80,300	84,700	89,200
Jun-17	80,400	85,300	90,300
Jun-18	80,300	85,600	90,900

Table A2: Average Projected prison population (financial year figures)

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
2013/14	82,800	84,600	86,600
2014/15	81,600	84,400	87,300
2015/16	80,700	84,600	88,500
2016/17	80,400	85,000	89,600
2017/18	80,400	85,500	90,600

Table A3: Comparison of 2011 based and 2012 based "no change" projections[6] (end of June figures)

	Central Projections		
	2011	2012	Difference
Jun-12	86,900	--	--
Jun-13	86,900	84,600	-2.7%
Jun-14	87,500	84,300	-3.9%
Jun-15	88,000	84,400	-4.3%
Jun-16	88,500	84,700	-4.5%
Jun-17	88,900	85,300	-4.3%
Jun-18	--	85,600	--

[5] All figures are rounded to the nearest hundred. Sub-populations may not sum to total populations due to rounding and due to overlaps in some sub-population categories

[6] The 2011 "lower" scenario is not directly comparable with the 2012 Scenario 1 projection and the 2011 "higher" projection is not directly comparable with the 2012 Scenario 3 projection. These are not shown.

Annual tables of subgroups within the overall projected prison population

Table A4: Projected determinate sentence prison population (end of June figures)

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Jun-13	53,100	54,100	55,200
Jun-14	52,700	54,300	56,000
Jun-15	52,400	55,000	57,700
Jun-16	52,400	55,700	59,100
Jun-17	52,900	56,700	60,600
Jun-18	53,200	57,400	61,600

Table A5: Projected indeterminate sentence prison population (end of June figures)

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Jun-13	13,100	13,100	13,200
Jun-14	12,400	12,500	12,600
Jun-15	11,800	12,000	12,100
Jun-16	11,300	11,500	11,700
Jun-17	10,800	11,100	11,300
Jun-18	10,400	10,700	11,000

Table A6: Projected remand prison population (end of June figures)

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Jun-13	10,600	11,000	11,500
Jun-14	10,600	11,000	11,600
Jun-15	10,500	11,000	11,700
Jun-16	10,400	11,100	11,600
Jun-17	10,500	11,000	11,700
Jun-18	10,500	11,100	11,600

Table A7: Projected recall prison population (end of June figures)

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Jun-13	4,900	5,100	5,300
Jun-14	4,900	5,100	5,300
Jun-15	4,800	5,100	5,300
Jun-16	4,800	5,100	5,300
Jun-17	4,800	5,100	5,300
Jun-18	4,800	5,100	5,300

Table A8: Projected non-criminal prison population (end of June figures)[7]

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Jun-13	1,200	1,200	1,200
Jun-14	1,200	1,200	1,200
Jun-15	1,200	1,200	1,200
Jun-16	1,200	1,200	1,200
Jun-17	1,200	1,200	1,200
Jun-18	1,200	1,200	1,200

Table A9: Projected fine defaulter prison population (end of June figures)[7]

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Jun-13	100	100	100
Jun-14	100	100	100
Jun-15	100	100	100
Jun-16	100	100	100
Jun-17	100	100	100
Jun-18	100	100	100

[7] Note that these projections are the same under all three projected scenarios

Table A10: Projected male 21 years and over prison population (end of June figures)

	Males 21 years and over					
	Total Population			Determinates		
Scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
Jun-13	70,900	72,200	73,700	44,600	45,400	46,300
Jun-14	69,900	71,700	73,800	44,300	45,500	46,900
Jun-15	69,100	71,900	74,900	44,200	46,200	48,300
Jun-16	68,600	72,200	75,900	44,200	46,900	49,700
Jun-17	68,700	72,700	76,900	44,700	47,900	51,000
Jun-18	68,600	73,000	77,500	45,000	48,500	52,000

	Indeterminates			Remand		
Scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
Jun-13	12,400	12,500	12,500	8,300	8,600	9,000
Jun-14	11,800	11,900	12,000	8,300	8,600	9,100
Jun-15	11,200	11,400	11,500	8,200	8,600	9,100
Jun-16	10,800	10,900	11,100	8,100	8,600	9,100
Jun-17	10,300	10,500	10,800	8,200	8,600	9,100
Jun-18	9,900	10,200	10,400	8,200	8,700	9,100

	Recall			Non Criminal		
Scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
Jun-13	4,300	4,500	4,600	1,100	1,100	1,100
Jun-14	4,300	4,500	4,700	1,100	1,100	1,100
Jun-15	4,300	4,500	4,700	1,100	1,100	1,100
Jun-16	4,300	4,500	4,700	1,100	1,100	1,100
Jun-17	4,300	4,500	4,700	1,100	1,100	1,100
Jun-18	4,300	4,500	4,700	1,100	1,100	1,100

Table A11: Projected male 18-20 years old prison population (end of June figures)

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Jun-13	6,900	7,000	7,100
Jun-14	7,000	7,200	7,300
Jun-15	6,900	7,200	7,500
Jun-16	6,900	7,200	7,500
Jun-17	6,800	7,200	7,600
Jun-18	6,800	7,200	7,500

Table A12: Projected female 18 years and over prison population (end of June figures)

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Jun-13	3,900	4,000	4,100
Jun-14	3,700	3,900	4,100
Jun-15	3,700	3,900	4,100
Jun-16	3,600	3,900	4,100
Jun-17	3,600	3,900	4,200
Jun-18	3,600	3,900	4,200

Table A13: Projected 15-17 years old prison population (end of June figures)[8]

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Jun-13	1,400	1,500	1,600
Jun-14	1,300	1,500	1,700
Jun-15	1,300	1,500	1,700
Jun-16	1,300	1,500	1,700
Jun-17	1,300	1,500	1,700
Jun-18	1,300	1,500	1,700

[8] This population only includes those aged 15-17 in Youth Offending Institutions. 15-18 year olds housed in Secure Children's Homes or Secure Training Centres are not included.

Monthly tables of overall projected prison population

Table A14: Monthly values of the overall projected prison population (end of month figures)

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Nov-12	86,200	86,900	87,400
Dec-12	83,800	84,500	85,300
Jan-13	84,200	85,200	86,200
Feb-13	83,900	85,100	86,300
Mar-13	83,500	84,800	86,200
Apr-13	82,900	84,300	85,900
May-13	83,200	84,800	86,500
Jun-13	83,000	84,600	86,500
Jul-13	83,000	84,800	86,800
Aug-13	83,400	85,200	87,200
Sep-13	83,600	85,400	87,400
Oct-13	83,600	85,400	87,400
Nov-13	83,400	85,300	87,300
Dec-13	81,200	83,100	85,100
Jan-14	82,100	84,100	86,200
Feb-14	82,400	84,400	86,600
Mar-14	82,100	84,300	86,400
Apr-14	81,900	84,000	86,300
May-14	82,100	84,400	86,800
Jun-14	81,900	84,300	86,900
Jul-14	81,900	84,500	87,200
Aug-14	82,100	84,900	87,700
Sep-14	82,200	85,000	87,900
Oct-14	82,100	85,000	88,000
Nov-14	82,000	85,000	88,000
Dec-14	79,800	82,700	86,000
Jan-15	80,700	83,800	87,100
Feb-15	81,000	84,400	87,700
Mar-15	81,000	84,400	87,800
Apr-15	80,900	84,300	87,800
May-15	81,000	84,600	88,200
Jun-15	80,900	84,400	88,100
Jul-15	81,100	84,700	88,500
Aug-15	81,400	85,100	89,000
Sep-15	81,400	85,300	89,200
Oct-15	81,500	85,200	89,300
Nov-15	81,200	85,200	89,300

	Sentencing Scenarios		
	Scenario 1	Scenario 2	Scenario 3
Dec-15	79,000	83,100	87,100
Jan-16	80,000	84,000	88,100
Feb-16	80,300	84,400	88,700
Mar-16	80,200	84,400	88,800
Apr-16	80,200	84,500	88,800
May-16	80,400	84,800	89,200
Jun-16	80,300	84,700	89,200
Jul-16	80,500	85,000	89,600
Aug-16	80,900	85,500	90,100
Sep-16	81,000	85,600	90,200
Oct-16	81,200	85,700	90,400
Nov-16	81,100	85,600	90,400
Dec-16	78,900	83,600	88,400
Jan-17	79,900	84,600	89,500
Feb-17	80,300	85,100	90,000
Mar-17	80,300	85,200	90,000
Apr-17	80,300	85,100	90,000
May-17	80,500	85,400	90,400
Jun-17	80,400	85,300	90,300
Jul-17	80,500	85,500	90,600
Aug-17	81,000	86,000	91,200
Sep-17	81,000	86,200	91,300
Oct-17	81,100	86,200	91,300
Nov-17	80,900	86,200	91,400
Dec-17	79,000	84,100	89,300
Jan-18	79,900	85,100	90,300
Feb-18	80,300	85,500	90,700
Mar-18	80,300	85,500	90,900
Apr-18	80,200	85,500	90,800
May-18	80,400	85,700	91,100
Jun-18	80,300	85,600	90,900
Jul-18	80,400	85,800	91,300
Aug-18	80,900	86,300	91,700
Sep-18	81,000	86,300	91,900
Oct-18	81,000	86,300	91,900
Nov-18	80,800	86,300	91,900
Dec-18	78,800	84,200	89,700

Appendix B: Testing the validity of 2012-2018 prison population projections

The figures in this bulletin are not predictions of the prison population – they are scenarios showing what the future prison population would look like under various circumstances. However, comparing the projections with actual figures allows us to assess whether the actual prison population is aligned to any of the projections and whether the corresponding scenario assumptions hold true.

As the model provides population figures for September 2012 we can compare our projections with the actual prison population at this point. Table B1 shows the percentage difference between the Scenario 2 projection and published population figures[9] for September 2012.

Table B1: Percentage Deviation of published prison population figures from Scenario 2 projection

	September 2012
Total Prison Population	1%
Sub Population	September 2012
Determinates	1%
Indeterminates	-1%
Remand	6%
Recall	-1%
Non Criminal	-6%
Fine Defaulters	-2%
Males 21 and over (Total)	2%
Males 21 and over (Determinates)	1%
Males 21 and over (Indeterminates)	-1%
Males 21 and over (Remand)	5%
Males 21 and over (Recall)	-2%
Males 18-20 (Total)	5%
Females 18 and over	4%
15 - 17 year olds	14%

The Scenario 2 projection is in line with published figures for September 2012 which deviate no more than 1.1 per cent from the projection, with the overall sub-population of determinate, indeterminate and recall populations deviating ±1 per cent.

[9] http://www.justice.gov.uk/statistics/prisons-and-probation/oms-quarterly

Most of the total population deviation occurs within the projected remand population (6.3 per cent), which accounts for 0.9 per cent of the total 1.1 per cent difference in Scenario 2. Past projections of remand have not provided any greater accuracy for this population. For example, projections published in 2010 predicted a central value which was higher than published figures by 6 per cent and in the 2011 published projections it deviated by -4 per cent. Assumptions used to model the remand population may be developed further in future.

The sub-populations provided for adult males are within ±2 per cent for all populations, except remand. The male 18-20 and female 18 and over populations deviate by at most 5 per cent. This has been influenced by the over-estimation of the remand population and the small population size.

The 15-17 year old population is a small, volatile population which is difficult to model accurately. Currently, the medium projection for 15-17 year olds deviates by 160 places (14 per cent difference). The 2011 projections provided no greater accuracy, with a deviation of 200 places.

The non-criminal population can be volatile and difficult to model because it is subject to change depending on where immigration detainees are held. Detainees held in prisons or in NOMS-run Immigration and Removal Centres are counted in the prison population, whereas detainees held elsewhere in the detention estate are only shown in UKBA detention figures. Past projections for non-criminals have not provided any greater accuracy for this population with deviation of -11 per cent in 2011 and 23 per cent in 2012.

Appendix C: Detail of models, scenarios and assumptions

The updated modelling approach

As part of wider work to develop a consistent and coherent suite of models of the criminal courts and offender management, driven by common projections of demand for the Ministry of Justice's services, the method used to generate this year's prison population projections has been revised and improved.

This amendment to the projection method involves increasing the granularity in the model for determinate sentences by allocating custodial sentence lengths by offence type. As in the 2011 projections, gender and age are also used in the allocation of custodial sentence lengths. These custodial sentence lengths are assigned to defendants by matching these characteristics to observed distributions of custodial sentence lengths and the percentage of custodial sentence served, which are taken from January 2011 to March 2012 data. This allows us to:

- understand the Criminal Justice System factors which contribute to change in the prison population, be they time served, sentences given, trial court and sentencing court changes, or shifts in the demographic characteristics of defendants;

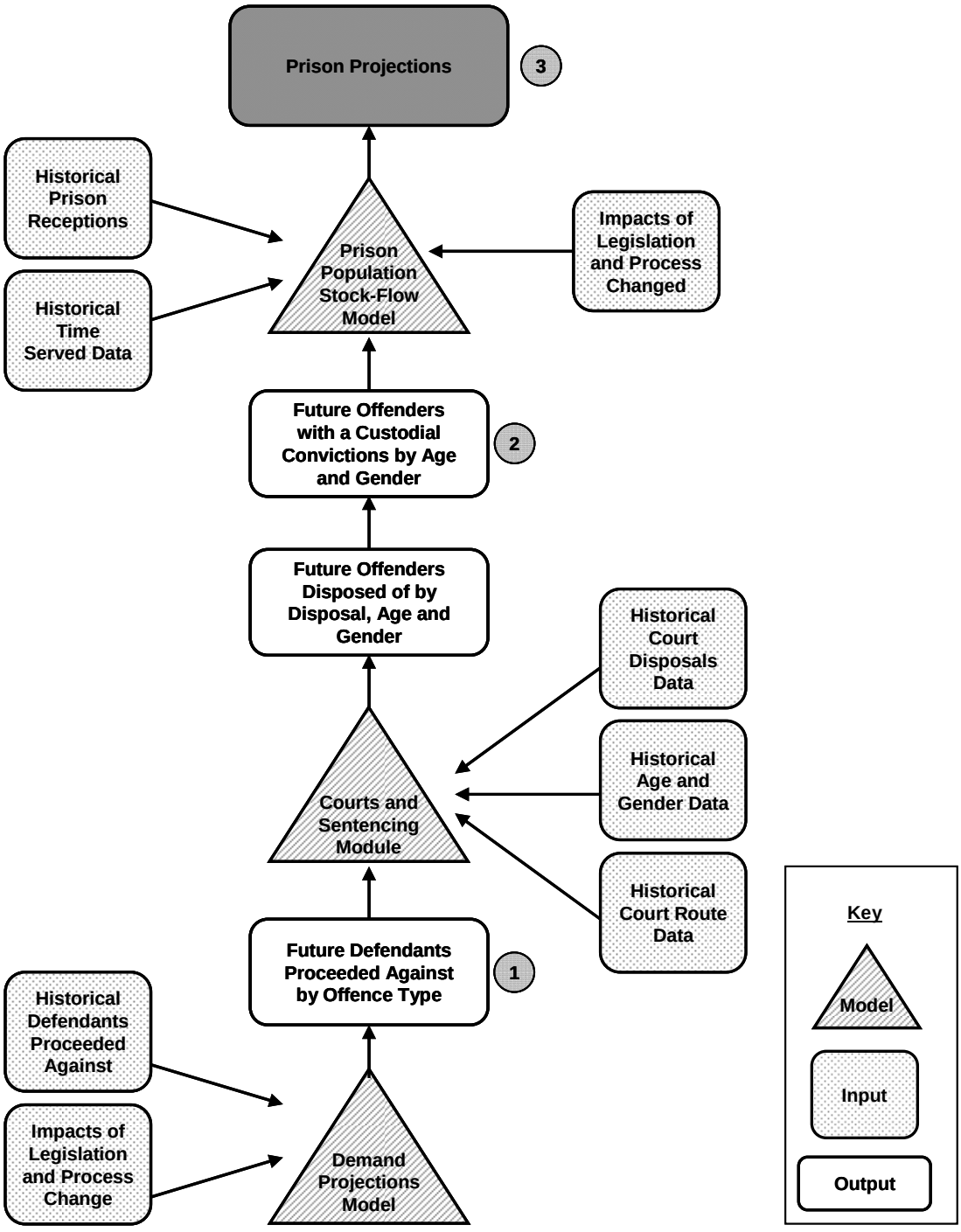
- more easily model the impact on the prison population of specific Ministry of Justice and other Criminal Justice Agency policy changes; and

- quantify some of the uncertainty around the time a defendant serves in prison.

Overview of the modelling approach

Central to the modelling approach is the Prison Population Stock-Flow model. Projections of future custodial convictions are fed into this model and outputs are adjusted to account for the impact of changes in legislation and process on the prison population, as shown in Figure C1, and described below.

Figure C1: Key Components of the prisons projections modelling system



1) Producing projections of defendants proceeded against

Projections of defendants proceeded against at court are chosen as the entry point to the modelling system because this is the entry point of defendants into the MoJ's area of responsibility. Underlying crime levels and the activities of the police and CPS will have an impact on the volume of defendants proceeded against. Consultation has taken place with the Home Office and CPS to understand these upstream impacts.

The Demand Projections Model produces baseline projections of all defendants proceeded against at court for 12 high-level offence categories based on historical time series data (January 2001 to May 2012) at a monthly resolution out to 2018. These are further sub-divided by age, gender and sub-offence using a top-down forecasting approach.

The demand projections are based on time series forecasting methods, including moving averages, exponential smoothing and ARIMA. Each offence category and its sub-categories are forecasted separately. Statistical error measurement scales and expert judgement are used in combination to find the most appropriate forecast model. Seasonality is applied based on the analysis of autocorrelations.

It should be noted that these projections can not be expected to track actual volumes of defendants proceeded against if there is any sudden or cumulative change which takes demand volumes or offence mix well outside the trends seen historically.

2) Converting the demand projections into custodial convictions

A Courts and Sentencing Module converts the demand projections into a set of projections of disposals by disposal type (including custodial convictions), offence, sex and age band at monthly resolution. These projections of custodial convictions by sex, age and offence type are used as a key input for the Prison Population Stock-Flow model.

The Courts and Sentencing Module is a combination of the Magistrates' and Crown Court Workload Models and the Sentencing Module. The demand projections are used as an input into a Magistrates' Workload Model, which uses historical data to split defendants into court routes (Table C1) and tracks their flow through the system. This informs the forecast for the number of cases for trial or sentence that will be received in the Crown Court Workload Model.

The Crown Court workload model takes forecasts of caseload and assigns various attributes (e.g. early guilty plea, remand status) to estimate likely hearing times and to prioritise the flow of cases through the system. The cases disposed of are then converted to the number of defendants disposed of using the observed ratio between cases and defendants for the time period of March 2011 to March 2012.

The key assumptions that are used in the Courts and Sentencing Module are:

- that there is no prioritisation of any age or sex group within the Magistrates' and Crown Court;
- the number of working days in each month is the primary driver of seasonality within the Magistrates' and Crown Court;
- no change in offence type occurs as cases move through the system;
- defendants that are tried at the Magistrates' Court proceed to sentencing without delay;
- delays within the Magistrates' Court are not significant for the monthly timescales used in the modelling; and
- a Magistrates' Court backlog will not develop during the forecast period.

The Sentencing Module takes the number of defendants disposed of in the Magistrates' Workload Model and the Crown Court Workload Model and applies sentencing splits using court proceedings data from January 2004 to March 2012 at a quarterly resolution. This results in a set of projections as broken down in Table C1. These are aggregated providing forecasts for each offence, gender, age and disposal category, which are used as the custodial conviction projections.

Table C1: Courts and Sentencing Module Splits Dimensions

Offence Type	Sex	Age	Court-Route	Disposal
Burglary	Male	Age 10-17	MC	Abcond Disch
Criminal Damage	Female	Age 18-20	MCCC	Fine
Drug Offences		Age 21+	CC	Commu Sent
Fraud and Forgery				Suspended sent
Indictable Motoring				< 6 months
Other				6 months & < 1
Robbery				1 year-4 year
Sexual Offences				4 year +
Summary Motoring				Indeterminate
Summary Non-Motoring				ODW
Theft and Handling				
Violence Against Person				

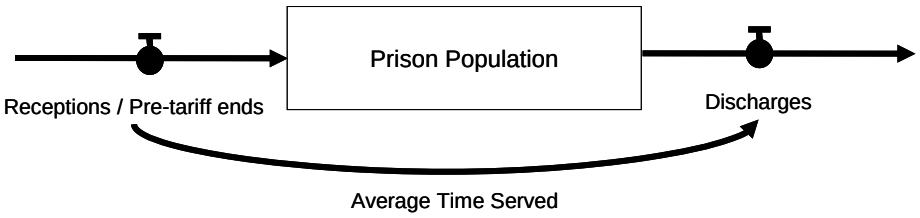
Key to the court route splits: MC: those tried and sentenced in the Magistrates Court; MCCC: those who are tried in the Magistrates Court and Sentenced in the Crown Court; CC: combines those defendants who are committed for trial in the Crown Court and sent for trial in the Crown Court into a single category.

If required, the Courts and Sentencing Module allows trends in the demographic splits and courts and sentencing processes to be implemented when projecting custodial convictions. This procedure was implemented to create the custodial convictions projections used in the three published scenarios.

3a) Producing prison population projections

Prison population projections are produced using the Prison Population Stock-Flow Model. The principal sub-populations in prison - determinate sentence, life sentence, imprisonment for public protection (IPP), remand and recall - are modelled using stock-flow structures based on the generic structure shown in Figure C2. The stock-flow structures model the flow of offenders into and out of prison and count the resulting prison population each month.

Figure C2: Generic stock-flow structure in the Prison Population Stock-Flow Model



For the determinate population, the monthly inflows to prison are based on the custodial convictions projections described above. These custodial convictions include offenders that may already be serving a sentence for a previous crime or those who would serve their whole custodial sentence on remand, meaning that they would not be a new reception to prison. Therefore, to convert from custodial convictions to prison receptions, the historical proportions of custodial receptions to prison receptions for each sub-population are calculated and averaged over the last twelve months of historical data (March 2011 to March 2012 inclusive). Projected receptions are set equal to projected custodial receptions multiplied by the relevant fraction for each sub-population.

Monthly outflows for the determinate population are based on observed custodial sentence lengths and the observed percentage of sentence length served taken from January 2011 to March 2012. Each projected offender that enters the model is given a custodial sentence length that is randomly selected from a distribution. This distribution is populated with custodial sentence lengths from actual offender receptions who share the same characteristics of offence, gender and age group in the observed time period. The per cent of custodial sentence length served is derived in the same manner, except that the observed distribution is made up of discharged offenders and the characteristic of custodial sentence length band is added.

Projected prison receptions are sub-divided by an age category, but an exact age of the offender is also applied in the same manner as the custodial sentence lengths. This allows the model to age the offenders whilst in prison.

The approach for the other sub-populations is similar and has not been revised since the 2011 publication, with the methodology as follows.

For recall prisoners, the model assumes there will be a certain fraction of recall receptions per conviction and sets recall receptions in the same month as their related conviction receptions. Recall discharged are based on a single average time served variable that is calibrated to fit the actual population over the time period August 2011 to July 2012. We assume that this effectively models the real world situation in which individual prisoners can be recalled a number of times and recall receptions are always some time after their related conviction receptions.

For remand prisoners, average custodial sentence lengths are calculated from remand receptions and remand populations and are not calibrated. Instead, reception projections are adjusted so that the modelled stock of prisoners is close to the actual historical numbers.

IPP and life sentence prisoners have an extra section in the stock-flow structure which models their pre-tariff detention. Outflows from this section into the generic stock-flow structure depend on tariff length.

Subsequent outflow for IPP and life sentence prisoners depends on the frequency and outcome of Parole Board hearings. The values of these parameters are set at the average of the last 12 months of data (April 2011-March 2012).

The non-criminal population is modelled differently. In this case, the projected size of the non-criminal population is set equal to the average size of the non-criminal population over the last 6 months of available data. This ensures that the non-criminal projections reflect the latest and most accurate count of the non-criminal population, as changes in the way that non-criminal population data are recorded mean that it is not possible to use a longer time range to estimate the future level of this population.

The population in prison at the end of each modelled month is aggregated into the categories defined by gender, current age group and, for determinate sentence prisoners, sentence length band, to produce raw, unadjusted prison population projections.

3b) Accounting for the impacts of circumstance, legislation, and for seasonal effects

The raw, unadjusted prison population projections are subject to model adjustments to show the impact of the Legal Aid, Sentencing and Punishment of Offenders Act. Model adjustments are also used to account for seasonal variation in the population. Model adjustments have been applied equally to all the scenarios modelled.

The Legal Aid, Sentencing and Punishment of Offenders Act, which achieved Royal Assent in May 2012, has been included as a post model adjustment. The estimated impacts have been applied to the indeterminate, determinate and remand populations.

Release arrangements for determinate sentence prisoners were changed in 2005 (as a result of changes made in the 2003 Criminal Justice Act) so that determinate sentence prisoners who committed offences from 2005 were released at the half way point of their sentence, instead of at the two-thirds point. In 2008 the Criminal Justice and Immigration Act applied this change retrospectively to most determinate prisoners who had committed offences before 2005. No model adjustments are required to model this change because there is sufficient historical data to ensure any impacts are captured in the model workings.

The other ongoing changes within the system included in previous published projections e.g. introduction of Morton Hall, are assumed to be captured in the past data and the trends detected therein.

Custodial conviction projections for each sub-population were smoothed using a centred 12 month average and seasonality was added back in to the final population projections. Seasonality was added to the smoothed projections where seasonality was identified using autocorrelation plots. It was added in to the smoothed projections over the future period using average seasonal adjustments seen in the historical populations.

Appendix D: Stakeholders consulted about scenarios

Internal stakeholders from across the Ministry of Justice.

External representatives from:

National Offender Management Service (NOMS)—Estates;

NOMS—Population Strategy;

NOMS—Public Protection Unit;

NOMS—Scenario Analysis Team;

The Magistrates' Association;

The Prison Service;

The Probation Service;

The National Bench Chairmen's Forum;

The Parole Board;

The Sentencing Council;

The Youth Justice Board.

Contact Points for further information

Current and previous editions of this publication are available for download from www.justice.gov.uk/publications/statistics-and-data/index.htm

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Produced by the Ministry of Justice