2015 COST OF SERVICE METHODOLOGY REVIEW

Manitoba Hydro Undertaking # 23

Manitoba Hydro to provide monthly capacity factor data for the following individual stations, Kettle, Long Spruce, and Limestone for five (5) different years, fiscal year 2002/2003, 2003/2004, 2013/2014, 2014/2015, and 2015/2016.

Response:

The requested data is provided in Figure 1, Figure 2 and Table 1 below. As Mr. Cormie discussed at pages 107 and 108 of the Transcript, under normal flow conditions, Manitoba load (capacity and energy) is completely served by hydraulic facilities and capacity reserves are supported through thermal and imports as well as hydro. In drought conditions, such as in the 2003/04 year, capacity reserves are supported by hydraulic facilities that are still capable of meeting energy requirements for short durations.

Figure 1 is a chart of annual capacity factors for Kettle, Long Spruce, Limestone and the aggregate of the three Lower Nelson River generating stations from fiscal year 1992/93 to 2015/16. Figure 2 is a chart of monthly capacity factors for Kettle, Long Spruce, Limestone and the aggregate of the three Lower Nelson River generating stations from fiscal year 1992/93 to 2015/16.

Table 1 includes the monthly and annual capacity factors for the Lower Nelson River generating stations from fiscal year 1992/93 to 2015/16.

Please note:

1. Water supply conditions are the primary variable affecting capacity factors. For example as shown in Figure 1, Lower Nelson River Capacity Factors range from approximately 40% to almost 90% for the period shown, with 2003/04 and 2005/06 being the driest and wettest years respectively.
2. Capacity factors were calculated based on 2015/16 net nominal interconnected capability values. Capability values can vary slightly from year to year for various reasons including: unit upgrades, removal of generator restrictions, changes to forebay operating ranges. These changes can affect the calculated capacity factor for a given station.
3. Other variables beyond those provided in (1) and (2) can also affect capacity factors. Examples of these include the addition of other supply sources, load growth, generation outages, river ice conditions, HVDC availability (in the case of the Lower Nelson River

generation), and interconnection availability. For example in Figure 2, the dip in capacity factors in September 1996 is largely attributed to the extended outage on the HVDC system as a result of a wind storm near Dorsey. Similarly, in October 2014, the 500 kV US tieline was out of service for the month, resulting in reduced export market access. This resulted in a temporary dip in the capacity factor of the Lower Nelson River stations.

Figure 1. Annual capacity factors for Lower Nelson River stations from 1992/93 through 2015/16.

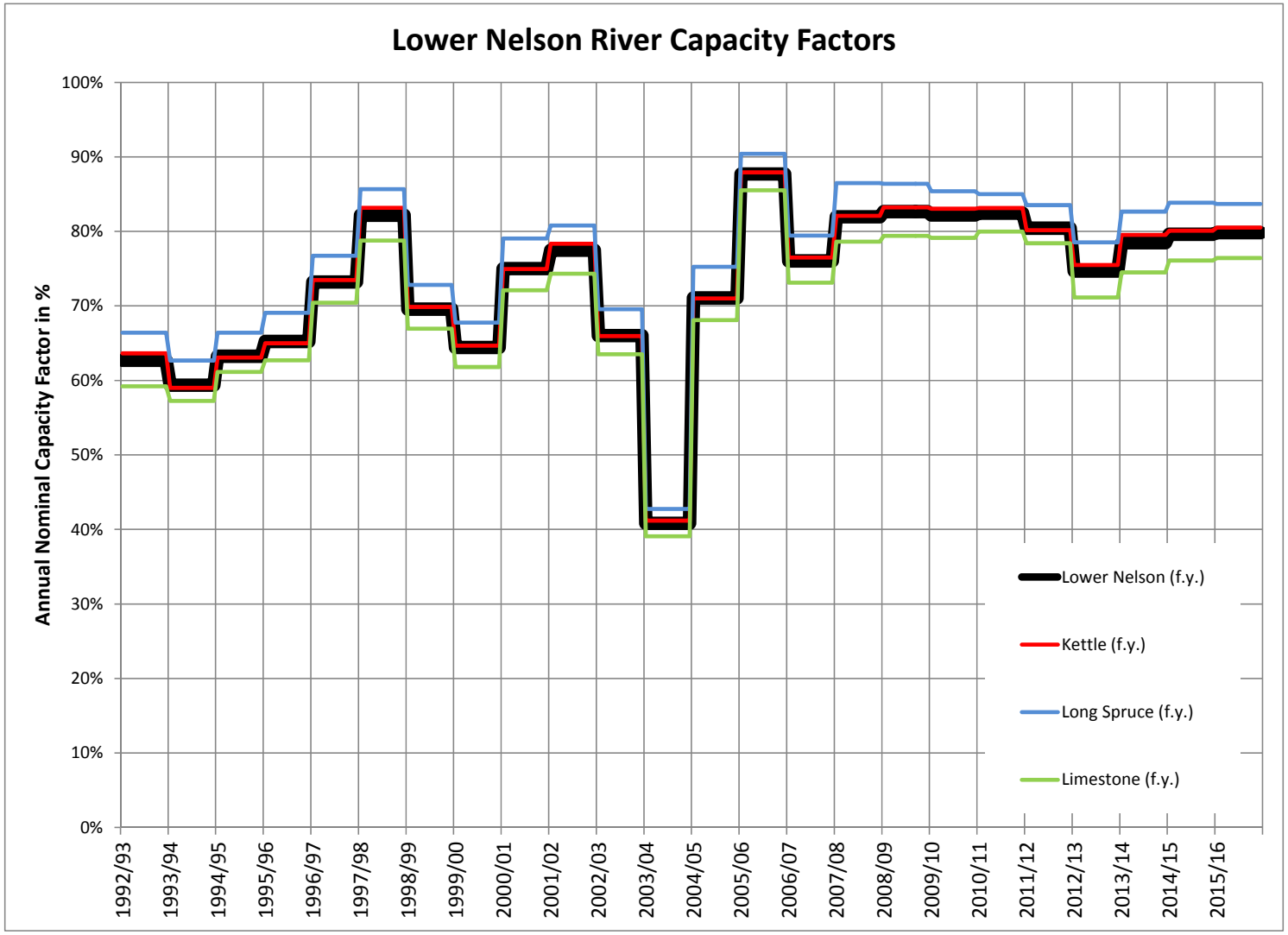

Figure 2. Monthly capacity factors for Lower Nelson River stations from 1992/93 through 2015/16.

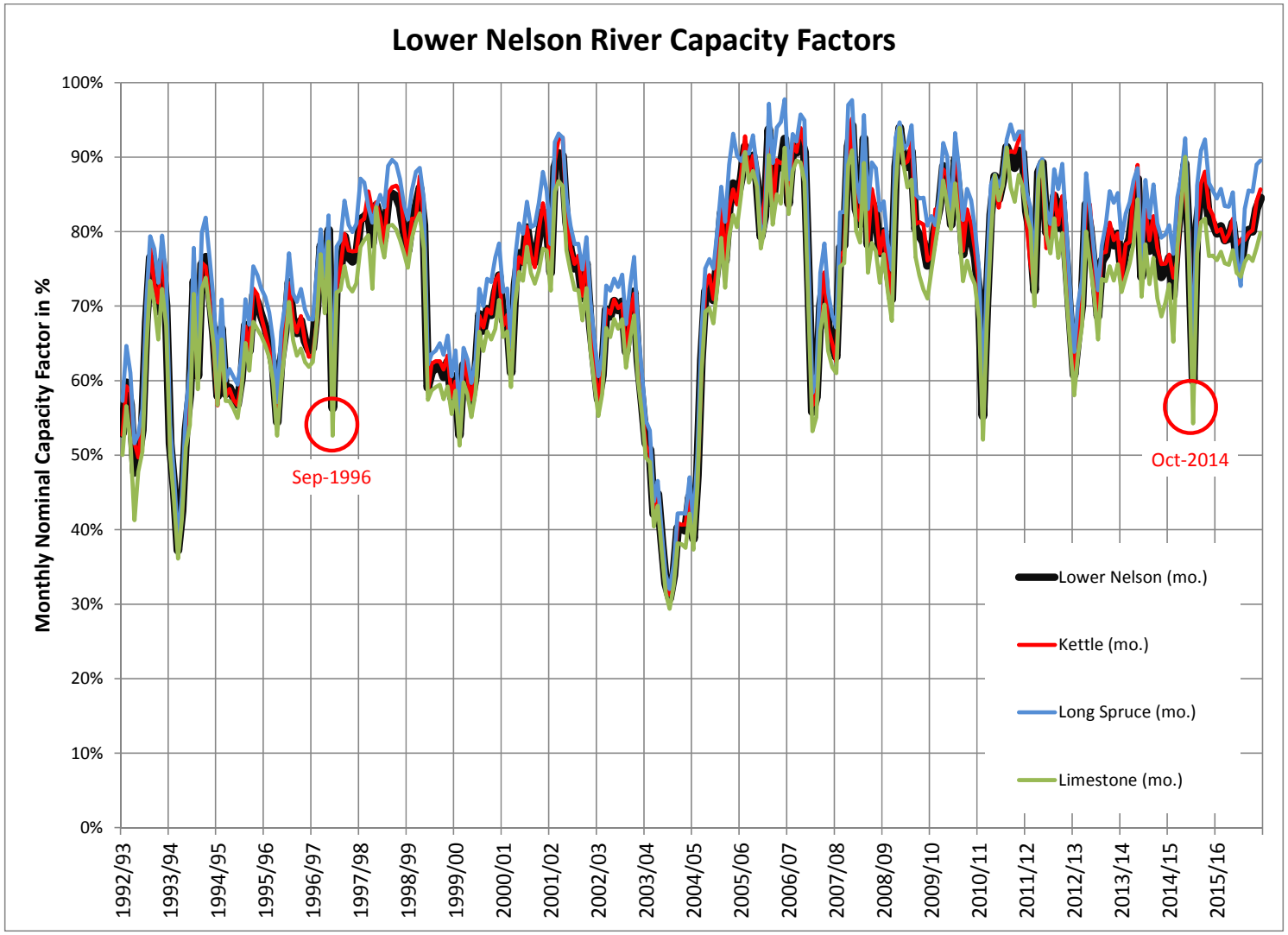

Table 1. Monthly and fiscal year nominal capacity factors for Lower Nelson River generation.

	Kettle	Long Spruce	Limestone	Lower Nelson River
1992/93	**64%**	**66%**	**59%**	**63%**
Apr	53%	57%	50%	53%
May	59%	65%	57%	60%
Jun	59%	61%	52%	57%
Jul	52%	52%	41%	48%
Aug	50%	53%	48%	50%
Sep	54%	56%	50%	53%
Oct	70%	71%	64%	68%
Nov	78%	79%	73%	77%
Dec	73%	78%	70%	73%
Jan	70%	73%	66%	69%
Feb	78%	79%	72%	76%
Mar	70%	74%	67%	70%
1993/94	**59%**	**63%**	**57%**	**59%**
Apr	51%	54%	50%	52%
May	46%	47%	44%	45%
Jun	37%	39%	36%	37%
Jul	42%	45%	41%	43%
Aug	54%	56%	51%	53%
Sep	60%	62%	54%	58%
Oct	72%	78%	72%	73%
Nov	60%	64%	59%	61%
Dec	76%	80%	72%	76%
Jan	75%	82%	74%	77%
Feb	71%	76%	69%	72%
Mar	64%	70%	65%	66%
1994/95	**63%**	**66%**	**61%**	**63%**
Apr	57%	61%	57%	58%
May	66%	71%	65%	67%
Jun	58%	60%	57%	58%
Jul	59%	62%	57%	59%
Aug	57%	61%	56%	58%
Sep	57%	59%	55%	57%
Oct	60%	63%	59%	60%
Nov	67%	71%	65%	67%
Dec	64%	68%	61%	64%
Jan	72%	75%	68%	71%
Feb	72%	74%	67%	71%
Mar	69%	72%	66%	69%
1995/96	**65%**	**69%**	**63%**	**65%**
Apr	66%	71%	65%	67%
May	64%	69%	63%	65%
Jun	61%	65%	60%	62%
Jul	54%	57%	53%	54%
Aug	63%	67%	60%	63%
Sep	66%	70%	64%	67%
Oct	73%	77%	71%	73%
Nov	68%	72%	65%	68%
Dec	66%	71%	63%	66%
Jan	69%	72%	64%	68%
Feb	65%	70%	62%	65%
Mar	63%	68%	62%	64%
1996/97	**73%**	**77%**	**70%**	**73%**
Apr	63%	68%	63%	64%
May	68%	75%	68%	70%
Jun	78%	80%	77%	78%
Jul	74%	74%	69%	72%
Aug	80%	82%	79%	80%
Sep	59%	58%	53%	56%
Oct	72%	78%	72%	74%
Nov	75%	79%	72%	75%
Dec	80%	84%	75%	79%
Jan	77%	81%	73%	77%
Feb	77%	80%	72%	76%
Mar	77%	81%	73%	77%
1997/98	**83%**	**86%**	**79%**	**82%**
Apr	81%	87%	78%	82%
May	82%	87%	79%	82%
Jun	85%	83%	80%	83%
Jul	83%	81%	72%	78%
Aug	84%	83%	83%	84%
Sep	82%	85%	79%	82%
Oct	78%	83%	77%	79%
Nov	85%	89%	81%	84%
Dec	86%	90%	81%	85%
Jan	86%	89%	80%	85%
Feb	85%	87%	79%	83%
Mar	80%	84%	77%	80%

Table 1. (continued)

	Kettle	Long Spruce	Limestone	Lower Nelson River
1998/99	**70%**	**73%**	**67%**	**70%**
Apr	77%	82%	75%	77%
May	82%	86%	79%	82%
Jun	82%	88%	81%	83%
Jul	87%	89%	82%	86%
Aug	81%	84%	78%	81%
Sep	59%	62%	57%	59%
Oct	62%	64%	59%	61%
Nov	63%	64%	59%	62%
Dec	63%	65%	59%	62%
Jan	61%	63%	58%	61%
Feb	63%	66%	59%	63%
Mar	58%	61%	56%	58%
1999/00	**65%**	**68%**	**62%**	**64%**
Apr	60%	64%	59%	61%
May	52%	55%	51%	53%
Jun	63%	64%	60%	62%
Jul	60%	63%	58%	60%
Aug	57%	60%	55%	57%
Sep	61%	63%	58%	61%
Oct	69%	72%	67%	69%
Nov	67%	70%	64%	67%
Dec	70%	74%	67%	70%
Jan	69%	73%	66%	69%
Feb	73%	77%	67%	72%
Mar	74%	78%	71%	74%
2000/01	**75%**	**79%**	**72%**	**75%**
Apr	67%	72%	66%	68%
May	69%	72%	67%	69%
Jun	61%	64%	59%	61%
Jul	73%	76%	70%	73%
Aug	77%	81%	75%	77%
Sep	76%	80%	73%	76%
Oct	81%	84%	78%	81%
Nov	77%	81%	74%	77%
Dec	75%	81%	73%	76%
Jan	80%	84%	75%	79%
Feb	84%	88%	78%	83%
Mar	81%	85%	77%	81%
2001/02	**78%**	**81%**	**74%**	**77%**
Apr	74%	78%	72%	75%
May	89%	92%	85%	89%
Jun	92%	93%	87%	90%
Jul	93%	93%	86%	90%
Aug	83%	85%	77%	81%
Sep	78%	81%	75%	77%
Oct	76%	78%	72%	75%
Nov	77%	78%	72%	75%
Dec	71%	75%	68%	71%
Jan	77%	79%	72%	76%
Feb	68%	71%	64%	67%
Mar	62%	66%	60%	62%
2002/03	**66%**	**70%**	**64%**	**66%**
Apr	57%	61%	55%	57%
May	61%	63%	58%	61%
Jun	70%	73%	67%	70%
Jul	69%	72%	66%	69%
Aug	71%	74%	68%	71%
Sep	70%	73%	67%	69%
Oct	70%	74%	68%	71%
Nov	63%	68%	62%	64%
Dec	69%	73%	66%	69%
Jan	72%	77%	69%	72%
Feb	62%	67%	60%	63%
Mar	57%	61%	56%	57%
2003/04	**41%**	**43%**	**39%**	**41%**
Apr	51%	55%	50%	52%
May	50%	53%	49%	51%
Jun	43%	44%	40%	42%
Jul	45%	47%	43%	45%
Aug	38%	40%	37%	38%
Sep	33%	34%	31%	33%
Oct	31%	32%	29%	31%
Nov	34%	35%	32%	34%
Dec	41%	42%	38%	40%
Jan	41%	42%	38%	40%
Feb	41%	42%	38%	40%
Mar	45%	47%	42%	44%

Table 1. (continued)

	Kettle	Long Spruce	Limestone	Lower Nelson River
2004/05	**71%**	**75%**	**68%**	**71%**
Apr	39%	41%	37%	39%
May	47%	50%	46%	47%
Jun	62%	66%	61%	63%
Jul	72%	75%	69%	72%
Aug	74%	76%	70%	73%
Sep	71%	75%	68%	71%
Oct	76%	80%	73%	76%
Nov	83%	86%	79%	83%
Dec	76%	81%	72%	76%
Jan	83%	89%	79%	83%
Feb	86%	93%	82%	86%
Mar	84%	90%	81%	84%
2005/06	**88%**	**90%**	**86%**	**88%**
Apr	88%	89%	85%	87%
May	93%	91%	91%	91%
Jun	88%	90%	87%	88%
Jul	90%	93%	88%	90%
Aug	86%	88%	86%	87%
Sep	81%	80%	78%	79%
Oct	84%	81%	81%	82%
Nov	95%	97%	90%	94%
Dec	82%	89%	81%	84%
Jan	90%	94%	85%	89%
Feb	89%	95%	84%	89%
Mar	89%	98%	91%	92%
2006/07	**76%**	**79%**	**73%**	**76%**
Apr	83%	87%	82%	84%
May	92%	93%	88%	91%
Jun	91%	92%	90%	91%
Jul	94%	96%	89%	93%
Aug	92%	95%	87%	91%
Sep	74%	77%	70%	73%
Oct	57%	58%	53%	56%
Nov	58%	61%	55%	58%
Dec	70%	74%	67%	70%
Jan	75%	78%	70%	74%
Feb	67%	72%	64%	67%
Mar	65%	69%	62%	65%
2007/08	**82%**	**86%**	**79%**	**82%**
Apr	63%	67%	61%	63%
May	77%	83%	75%	78%
Jun	77%	83%	76%	78%
Jul	90%	97%	89%	91%
Aug	95%	98%	91%	94%
Sep	83%	87%	80%	83%
Oct	81%	84%	79%	81%
Nov	94%	96%	89%	92%
Dec	79%	83%	75%	78%
Jan	86%	89%	78%	84%
Feb	83%	89%	77%	82%
Mar	77%	83%	73%	77%
2008/09	**83%**	**86%**	**79%**	**83%**
Apr	80%	84%	77%	80%
May	75%	78%	72%	75%
Jun	71%	75%	68%	71%
Jul	89%	93%	86%	89%
Aug	93%	95%	94%	94%
Sep	89%	91%	89%	90%
Oct	89%	92%	86%	89%
Nov	92%	94%	87%	91%
Dec	81%	85%	77%	80%
Jan	81%	84%	74%	79%
Feb	81%	85%	72%	79%
Mar	76%	81%	71%	75%
2009/10	**83%**	**85%**	**79%**	**82%**
Apr	77%	82%	75%	77%
May	83%	81%	78%	81%
Jun	83%	85%	82%	83%
Jul	88%	92%	87%	89%
Aug	88%	90%	84%	87%
Sep	81%	81%	80%	81%
Oct	90%	93%	86%	90%
Nov	87%	88%	80%	85%
Dec	77%	82%	73%	77%
Jan	83%	86%	76%	81%
Feb	81%	84%	74%	79%
Mar	78%	81%	73%	77%

Table 1. (continued)

	Kettle	Long Spruce	Limestone	Lower Nelson River
2010/11	**83%**	**85%**	**80%**	**82%**
Apr	73%	75%	68%	72%
May	57%	58%	52%	55%
Jun	72%	74%	68%	71%
Jul	82%	86%	79%	82%
Aug	87%	88%	88%	87%
Sep	83%	86%	84%	84%
Oct	87%	88%	86%	87%
Nov	90%	92%	91%	91%
Dec	91%	94%	86%	90%
Jan	91%	92%	84%	89%
Feb	92%	93%	88%	91%
Mar	93%	93%	86%	91%
2011/12	**80%**	**84%**	**78%**	**80%**
Apr	81%	85%	82%	83%
May	76%	83%	80%	80%
Jun	72%	75%	70%	72%
Jul	88%	89%	87%	88%
Aug	89%	90%	89%	89%
Sep	78%	83%	80%	80%
Oct	81%	81%	77%	79%
Nov	85%	88%	82%	85%
Dec	81%	86%	76%	81%
Jan	85%	89%	80%	84%
Feb	77%	81%	72%	76%
Mar	69%	72%	65%	68%
2012/13	**75%**	**79%**	**71%**	**75%**
Apr	61%	64%	58%	61%
May	66%	70%	64%	66%
Jun	71%	74%	67%	70%
Jul	84%	88%	80%	84%
Aug	84%	83%	76%	80%
Sep	77%	78%	72%	75%
Oct	69%	72%	66%	69%
Nov	77%	78%	74%	76%
Dec	77%	81%	73%	77%
Jan	81%	85%	75%	80%
Feb	79%	84%	73%	78%
Mar	80%	85%	76%	80%
2013/14	**80%**	**83%**	**75%**	**78%**
Apr	73%	79%	72%	74%
May	78%	82%	74%	78%
Jun	79%	84%	76%	79%
Jul	86%	87%	78%	83%
Aug	89%	89%	84%	87%
Sep	76%	75%	71%	74%
Oct	83%	87%	78%	82%
Nov	79%	82%	73%	77%
Dec	82%	86%	76%	81%
Jan	78%	81%	71%	76%
Feb	76%	79%	69%	74%
Mar	76%	80%	70%	75%
2014/15	**80%**	**84%**	**76%**	**80%**
Apr	77%	81%	73%	76%
May	74%	77%	65%	71%
Jun	76%	85%	78%	79%
Jul	85%	87%	84%	85%
Aug	85%	93%	90%	89%
Sep	80%	79%	76%	78%
Oct	63%	64%	54%	60%
Nov	81%	86%	77%	81%
Dec	86%	91%	81%	86%
Jan	88%	92%	82%	87%
Feb	83%	87%	77%	82%
Mar	82%	86%	77%	81%
2015/16	**81%**	**84%**	**76%**	**80%**
Apr	80%	84%	76%	80%
May	80%	86%	77%	81%
Jun	79%	83%	76%	79%
Jul	80%	83%	76%	79%
Aug	82%	85%	78%	81%
Sep	78%	77%	74%	76%
Oct	79%	73%	74%	75%
Nov	79%	83%	76%	79%
Dec	80%	86%	77%	80%
Jan	80%	85%	76%	80%
Feb	84%	89%	78%	83%
Mar	86%	90%	80%	85%