# Proposed Cut-Off Lengths to Split Recruits and Adults for Anchovy Commercial Landings

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In the absence of the availability of Age Length Keys for anchovy catch data, assumptions about the age composition of the anchovy catches are needed. Previous assessments and management procedures have been based upon the assumption that all anchovy caught from April to October were recruits (0-year-olds), while all anchovy caught from November to March were 1-year-olds, with 2-year-old and older fish not appearing in the catches at all. These assumptions were based upon the life-history characteristics of anchovy and general fishing patterns (De Oliveira 2003).

This document considers whether a (monthly varying) cut-off length could instead be used to split the anchovy catch into juveniles and adults (1 year-olds only) for each month of the year.

## Method

The anchovy raised length frequencies (RLFs) for each available month between 1987 and 2006 were plotted for the combined ("western", "southern" and "eastern") areas. These plots are shown in the figures in the appendix together with the proposed cut-off lengths for each month. Blank plots represent months for which no anchovy were caught. No sampling of the landings in August and September 1990, December 1993, November 1996 and December 2005 was carried out. These cases are indicated by grey plots.

## Results

January: Proposed cut-off at 7cm

This cut-off length resulted in the large majority of the catch being adults (in line with the assumption in previous assessments). 1995 had a sizeable number of recruits in the catch, while this cut-off length also implies smaller numbers of recruits in the January 1996, 1998, 2003 and 2004 catches. When considering the length frequencies in the May recruit surveys, the recruitment in 1995 (November 1994) and 2003 (November 2002) was early, while that in 1998 was late (Janet Coetzee pers comm.).

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February: Proposed cut-off at 8cm

As for January, this cut-off length resulted in the large majority of the catch being adults. The catches in February 1990, 1995, 2003 and 2004 contained a number of recruits, while the February 1991 and 1997 catches were predominantly recruits. According to length frequency comparisons from the May surveys, recruitment in 1991, 1995 and 1997 (November 1990, 1994 and 1996 respectively) was early (Janet Coetzee pers comm.) contributing to the large numbers of recruits in the catch. The model predicted recruitment in May 1991, 1995, 1997, 2003 and 2004 was good (Figure 1). Although recruitment was also good in 2001 and 2002, the February catch in these years consisted of very few recruits. Recruitment in 2002 (November 2001) was uncharacteristically late (Janet Coetzee pers comm.).

March: Proposed cut-off at 9cm

The distributions were not generally bimodal so no obvious length at which to split between recruits and 1-year-olds was evident. In general, this proposed cut-off length resulted in more recruits in the catch than observed in February. As for the results for February, there were a large number of recruits in 1990, 1991, 1995, 2003 and 2004, with 1996 and 2000 now added. The cut-off length is (undesirably) at the mode of the distribution for 2001.

April: Proposed cut-off at 9.5cm

Both a 9.5cm and 10cm cut-off were considered for April. The former moved the split away from the distribution peak in some years, while the cut-off length is (undesirably) at the mode of the distribution for 2002 and 2005. This cut-off length still allows for some adults in the catch (contrary to assumptions in previous assessments).

May: Proposed cut-off at 10cm

This cut-off length resulted in the catch being mostly recruits except in 1987 to 1989, 1993, 2002 and 2003 when some adults were caught.

June – September: Proposed cut-off at 10.5cm

This resulted in the catch being almost entirely recruits except in 1987, 1988 and 1989 when some adults were caught.

October: Proposed cut-off at 10.5cm

This resulted in the catch almost always consisting of recruits only.

November: Proposed cut-off at 5cm

This cut-off length resulted in there being virtually no recruits in the catch (note that what were recruits in October are now considered to have passed their first birthday).

December: Proposed cut-off at 6cm

As for November, this cut-off length resulted in hardly any of the catch consisting of recruits, although in 2002 some recruits were caught.

**Discussion**

Although the cut-off lengths in some years proved to be a little contrary to what one would *a priori* expect (i.e. more/less recruits in the catch than expected), it would be desirable for simplicity to apply the same cut-off length for each month to all years. Comments and discussion on the above proposed cut-off lengths are welcomed. In particular, should a higher cut-off length be considered for some months between (May and October)? This doesn't seem necessary, however, to exclude all adults from the catch in these months.

The catch-at-age for anchovy needs to be calculated shortly and is dependent on the following decisions being made:

i) whether applying a cut-off length to each month is the preferred option to the past assumption that adults are caught from November to March and juveniles from April to October, and

ii) if monthly cut-off lengths are to be applied, these cut-off lengths need to be finalised.

**Acknowledgements**

Jan van der Westhuizen is acknowledged for suggesting the cut-off length approach and thanked for providing the raised length frequencies for these comparisons. Janet Coetzee is thanked for analysing the length frequencies from the May recruit surveys to provide an indication of early or late recruitment.

**References**

Cunningham, C.L. and Butterworth, D.S. 2004. Base Case Bayesian Assessment of the South African Anchovy Resource. Unpublished MCM Document WG/PEL/APR04/01. 19pp.

De Oliveira, J.A.A. 2003. The Development and Implementation of a Joint Management Procedure for the South African Pilchard and Anchovy Resources. PhD Thesis, University of Cape Town, South Africa.

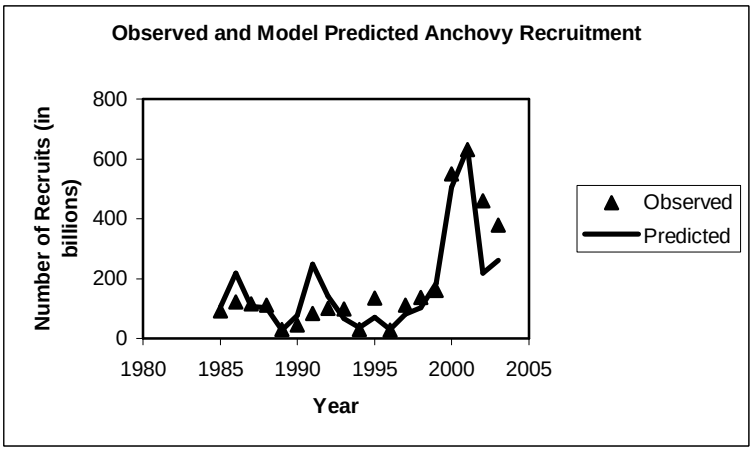
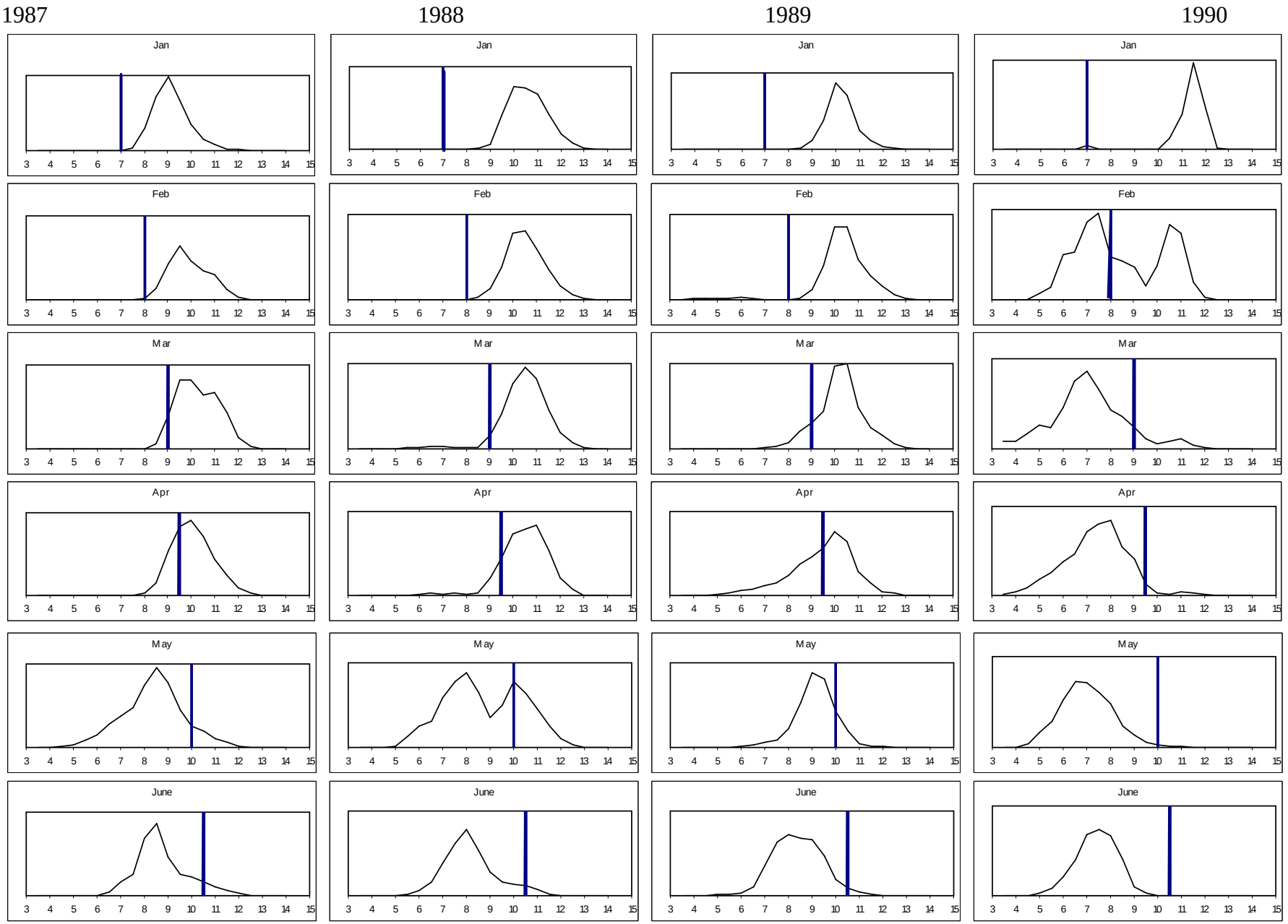



*Figure 1. Observed and model predicted uncapped anchovy recruitment numbers from May 1985 to May 2003 from Cunningham and Butterworth (2004).*

**Appendix**

The monthly RLFs are plotted for each year together with the proposed cut-off length (vertical solid lines). The horizontal-axes denote length classes in cm. The figures are arranged such that the months of January to June and July to December are presented together. Each column contains a set of six months from the year labelled at the top of the column, while each row contains the figures for a particular month over four years. Note that the scales on the vertical axes are not standardised throughout. Instead the maximum has been modified for each plot to aid in the comparison between the spread of the RLF (so that the units for the height of the RLFs are not comparable across months and years) in relation to the proposed cut-off lengths.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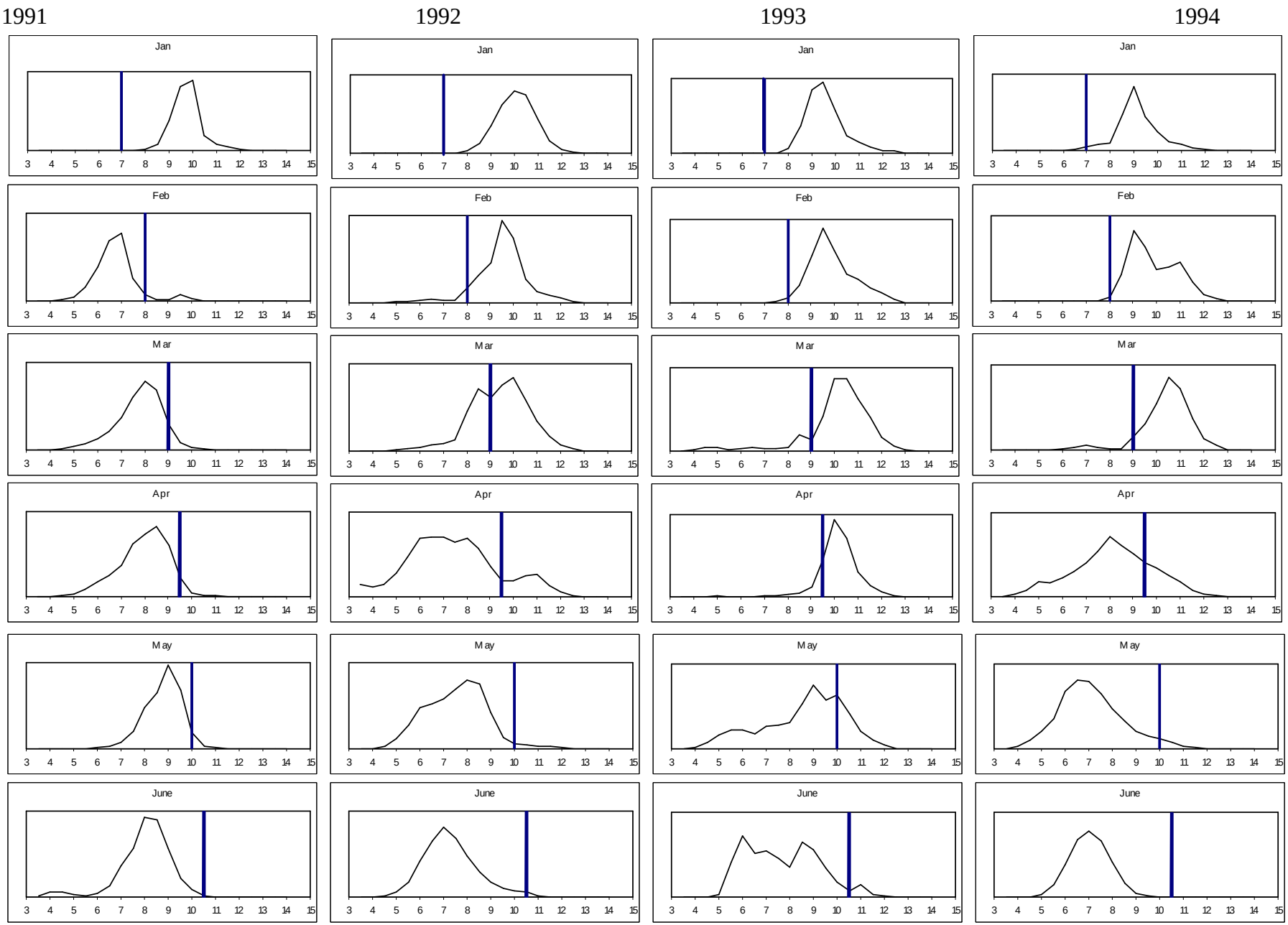
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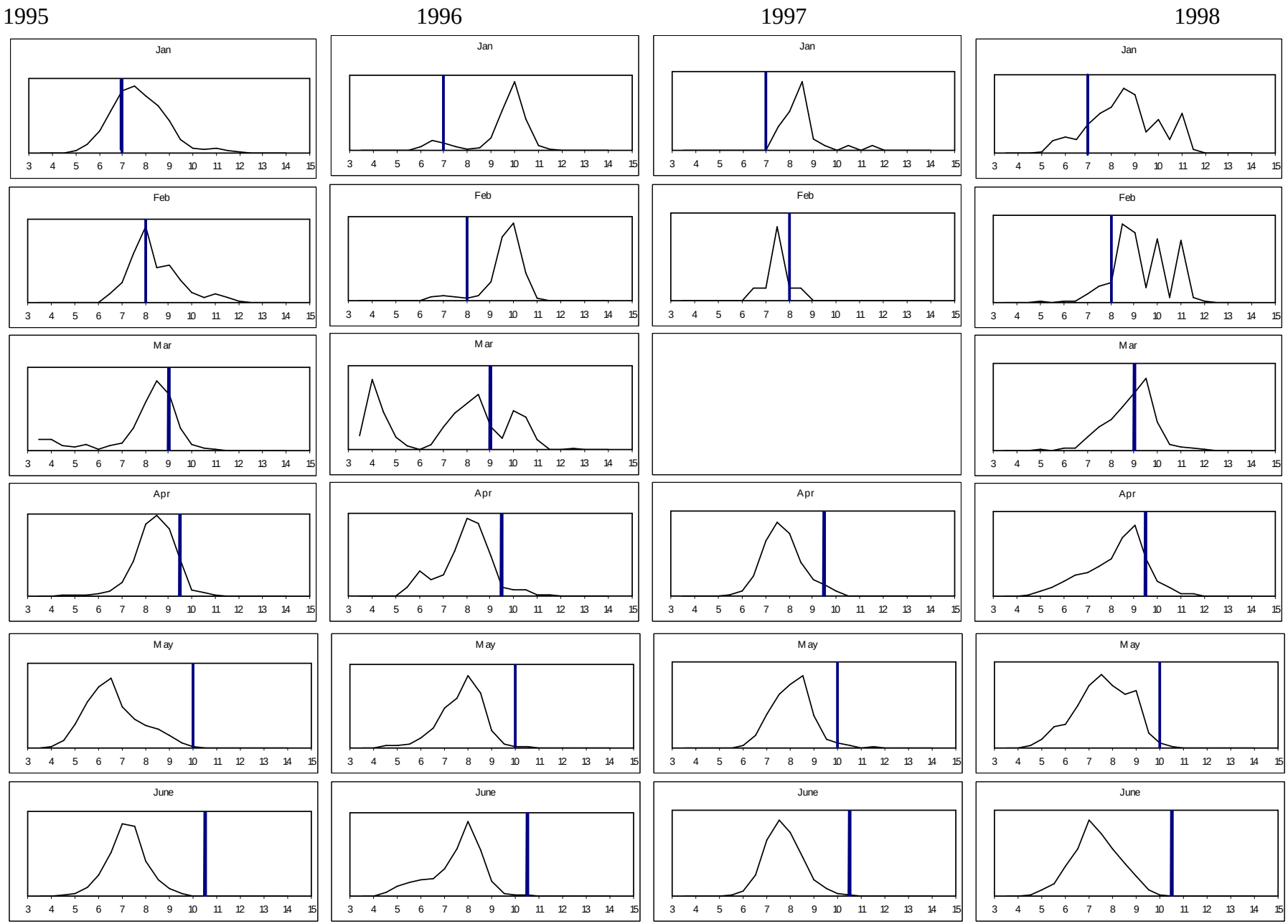
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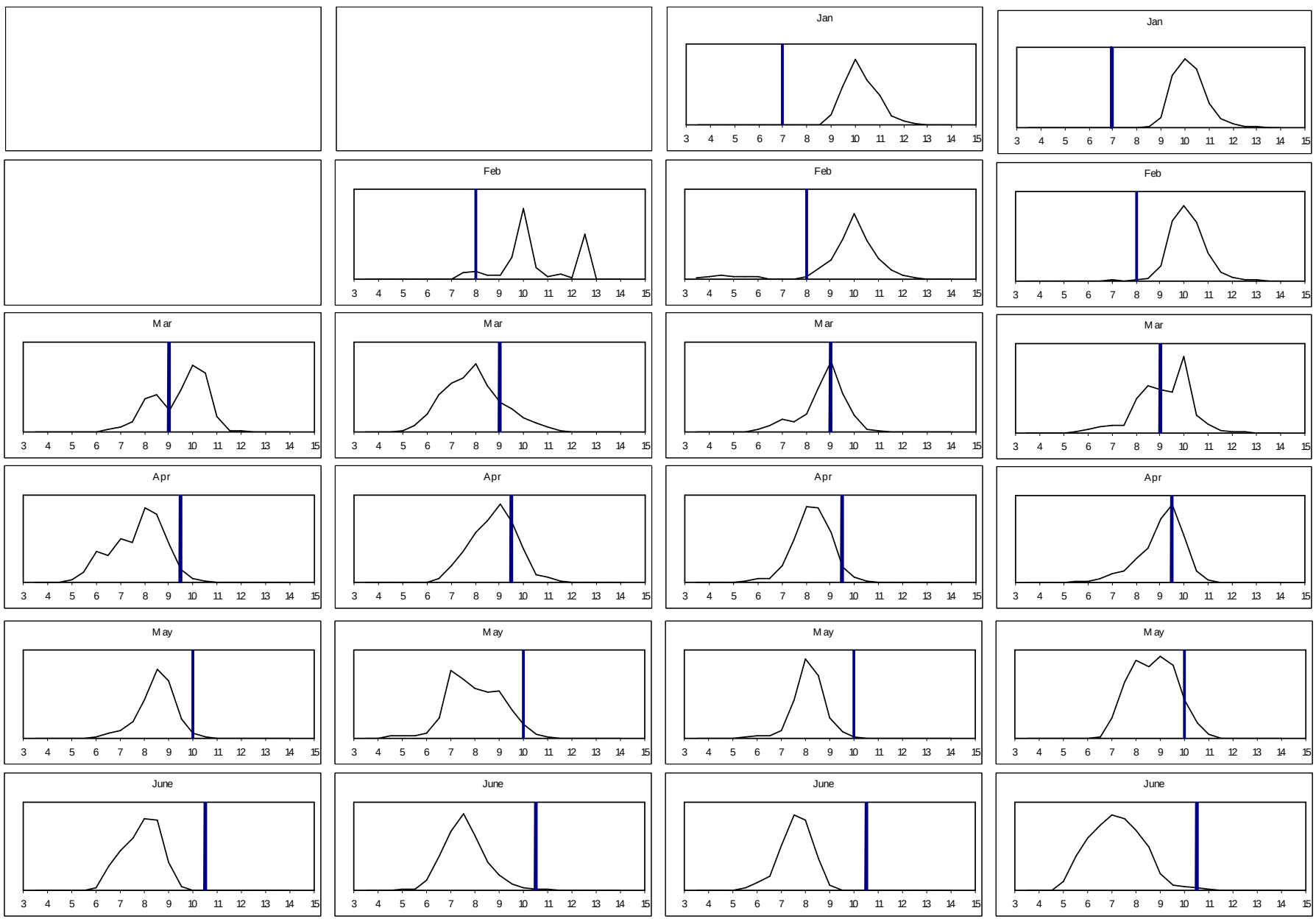
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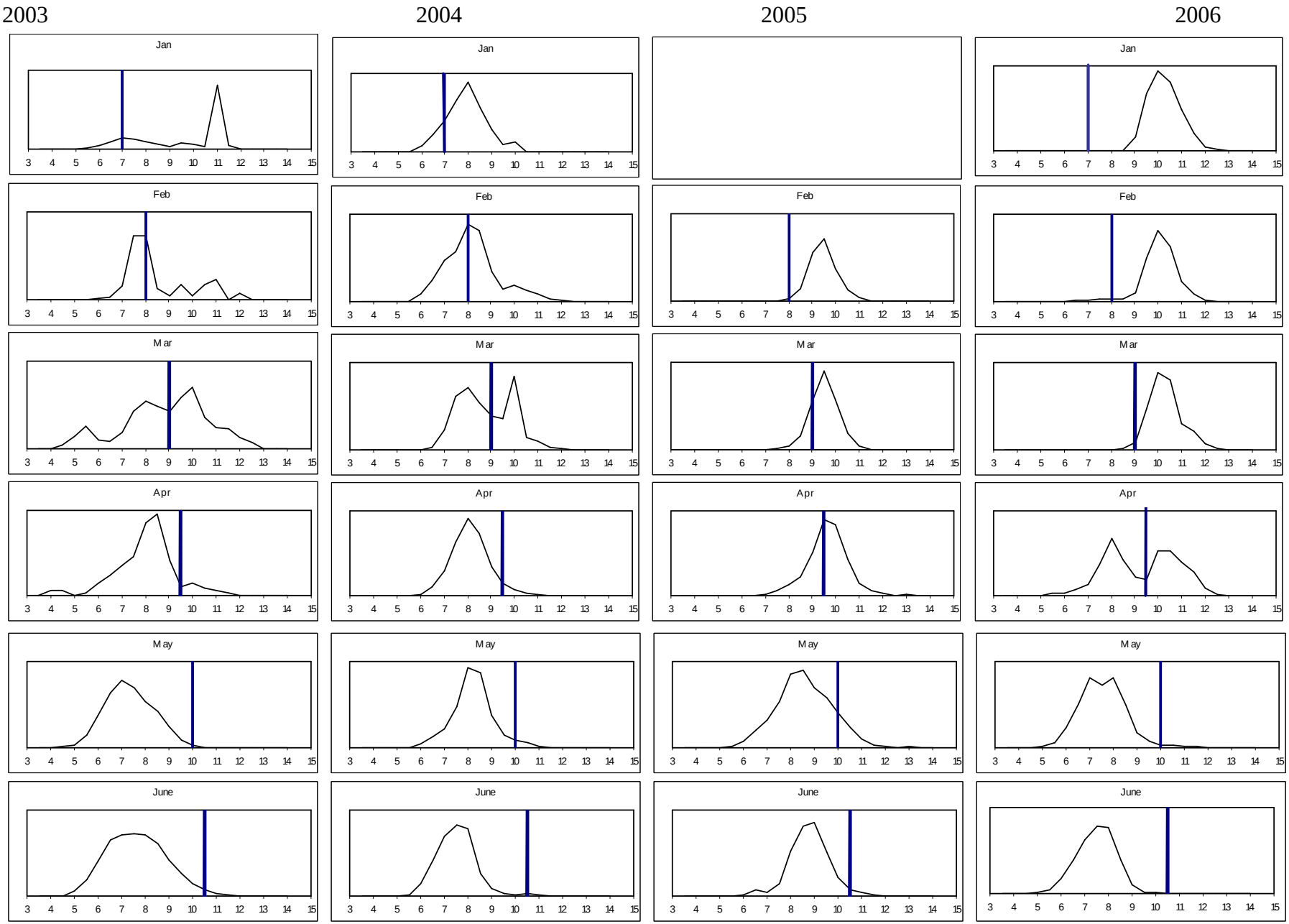
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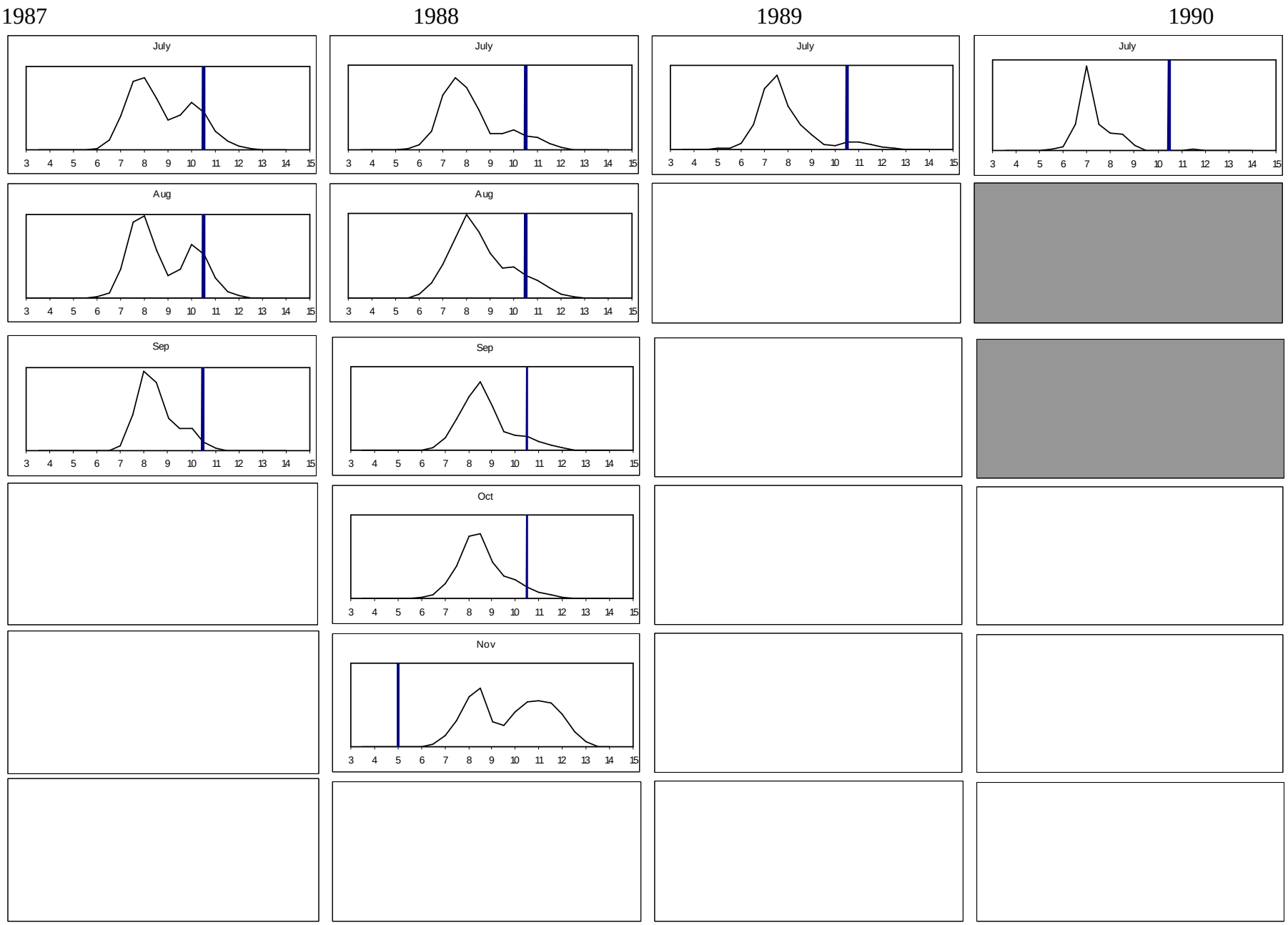
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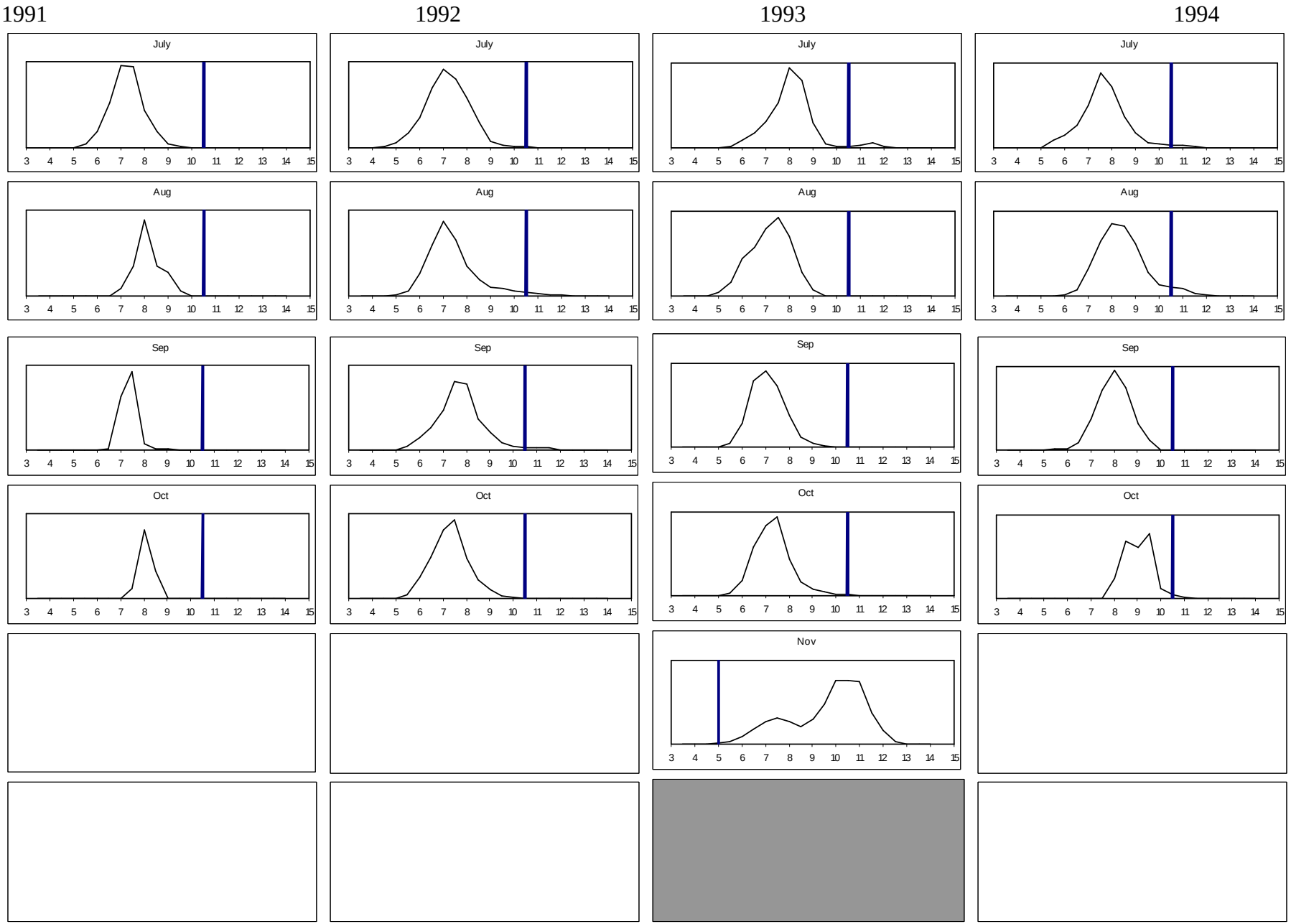
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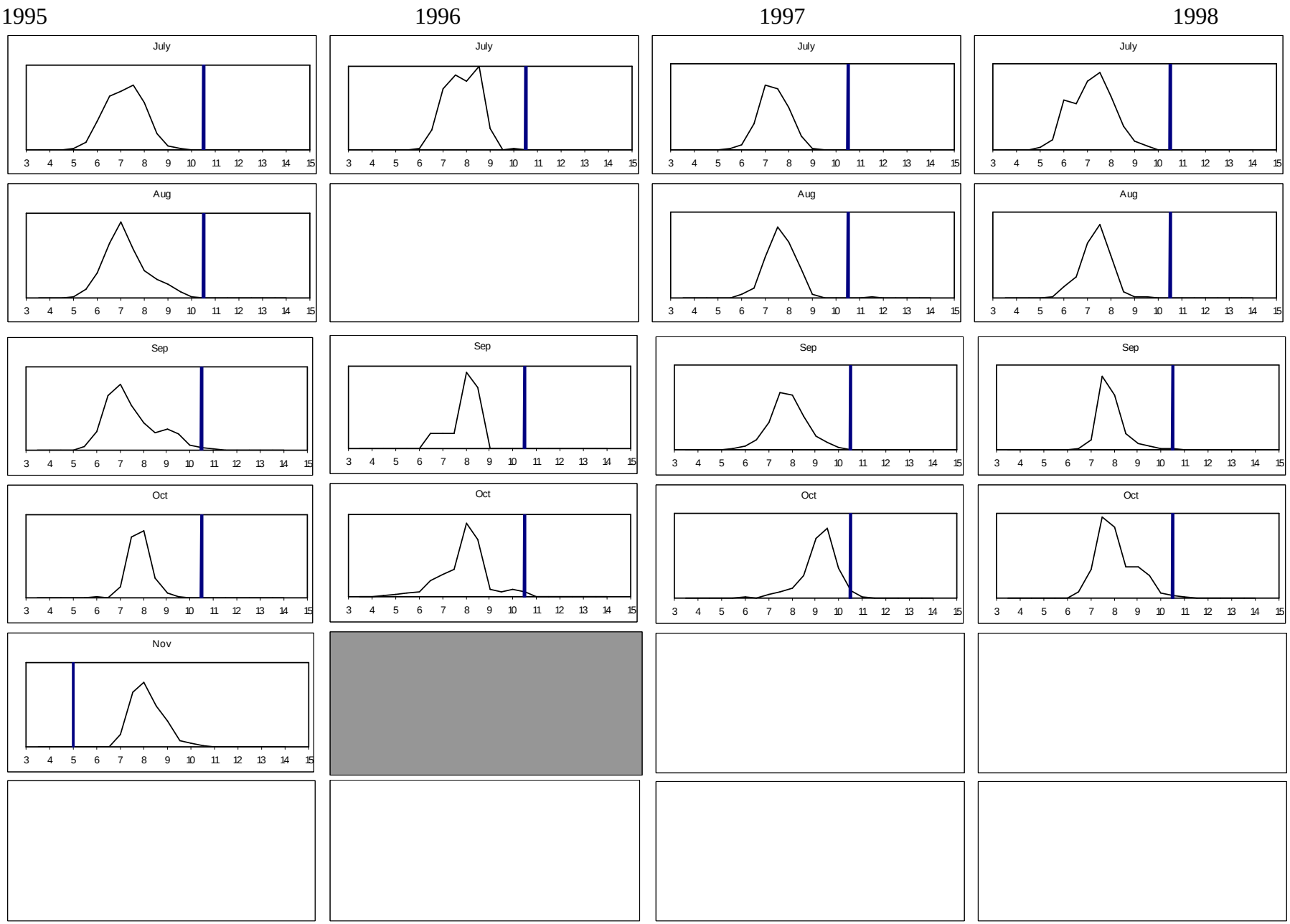
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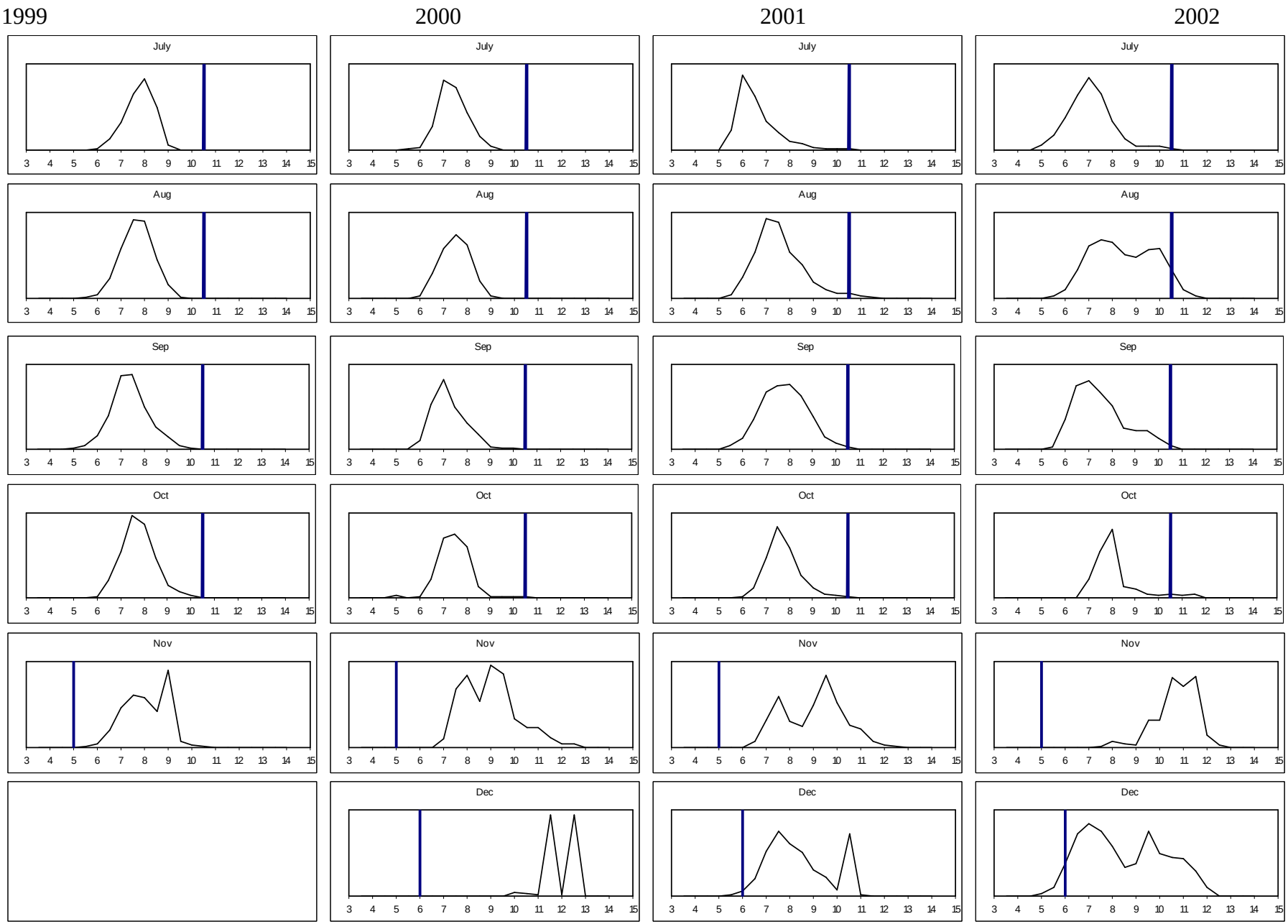
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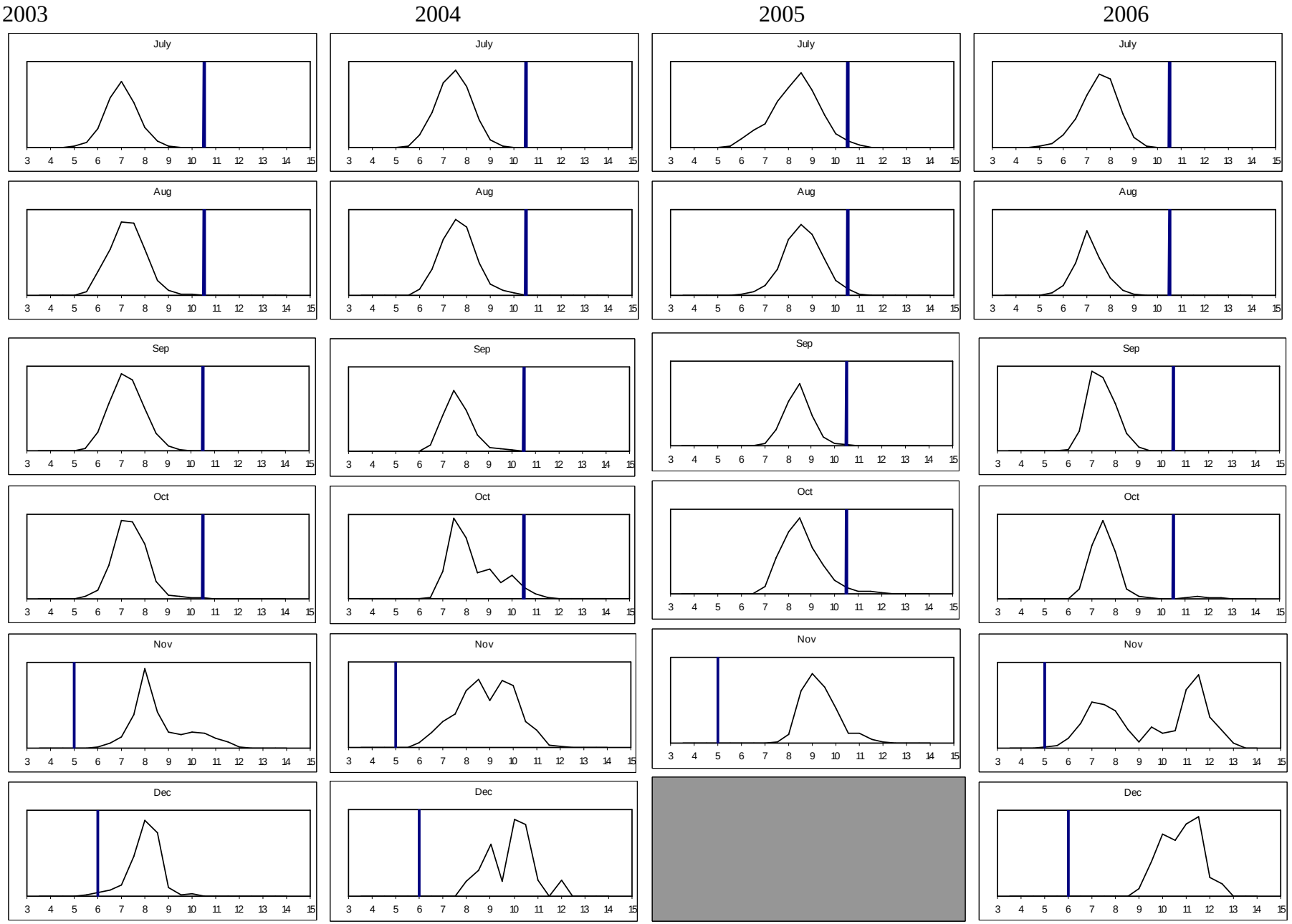
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