Management of the River Murray During Periods of Extended Drought

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This thesis is dedicated to the late

Ian Edward Laing

Ian inspired the topic of the research undertaken by the author but his untimely death at Christmas 1986 meant that he was only able to see the results of the first four months of study. At that time, Ian held the position of Principal Engineer Water Resources Planning, of the Water Resources Branch of the Engineering and Water Supply Department of South Australia.

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Abstract

The techniques of synthetic hydrology are used to evaluate the effects of various reserve strategies for the River Murray with regard to the assessment of system failure.

A multiple lagged Markov type model is used in combination with a shifted power data transformation to generate spatially and temporally correlated rainfall and streamflow data. This synthetic data is then used in simulation modelling to assess failure probabilities. Results using different transformation and generation procedures are compared. Conclusions as to the adequacy of the methods employed are drawn using statistical comparisons.

Declaration

To the best of my knowledge and belief I declare that:

- This thesis contains no material that has been accepted for the conferring of any other degree or diploma from any University or Institution of higher learning.
- No previously published material has been included in this thesis except where express reference has been made to that material in the text.

Chris Burton

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The co-operation of the Water Resources Branch of the Engineering and Water Supply Department of South Australia has been greatly appreciated. Special thanks are also due to the River Murray Commission[1] who provided the original data used in this analysis, and also provided use of the simulation model of the River Murray which enabled the risks of failure analysis to be undertaken.

Special thanks are also due to those people, too numerous to mention, who provided encouragement and assistance with the vast amount of computing which was required for this research.

This manuscript was typed by the author and typesetting effected using the LaTeX[19] document preparation system.

[1]On the 1st of January 1988 the River Murray Commission changed its name to the Murray-Darling Basin Commission. In this thesis reference is made only to the River Murray Commission as this was the correct name during most of the research period.

Chapter 1

Introduction

Due to the stochastic nature of general climatic processes including evaporation and rainfall, a major tool used in the analysis of such processes is statistics. This is especially true in the analysis of hydrologic data sets where, in general, a relatively small quantity of data is available. For the efficient design of water retaining and distribution structures and the implementation of more economic operational procedures for such structures, a large body of information needs to be extracted from the historical data set.

The purpose of this research is to investigate some of the hydrological processes associated with the River Murray and its major tributaries. (Figure 1.1 shows the extent of the Murray-Darling basin). The intention is to establish a more equitable set of operational procedures for use during extended periods of low flow. In particular, the declaration of periods of restriction.

This thesis is organized in the following format:

Chapter 2 provides a background to and the geography of the River Murray. Some description of past and present operating procedures is also given.

Chapter 3 reviews literature in the fields of data transformation and generation, and the statistical assessment of data.

Chapter 4 details the procedures used in this study to transform the historical data sets to better approximate the normal or Gaussian distribution.

Chapter 5 gives the details of the synthetic generation process used to generate the long period records used in this study.

Chapter 6 describes the methods used to perform the storage/behavior analysis of the Murray which was used to evaluate the risks of failure with varying operational strategies.

Chapter 7 summarizes the results obtained from the study. The quality of data transformation and generation is studied as well as assessing the reserve policy.

Chapter 8 gives a summary and conclusions drawn from the research.

Appendices The various appendices referenced throughout the text are in most cases a complete set of statistics, or other data where only a small sample has been included within the document proper.

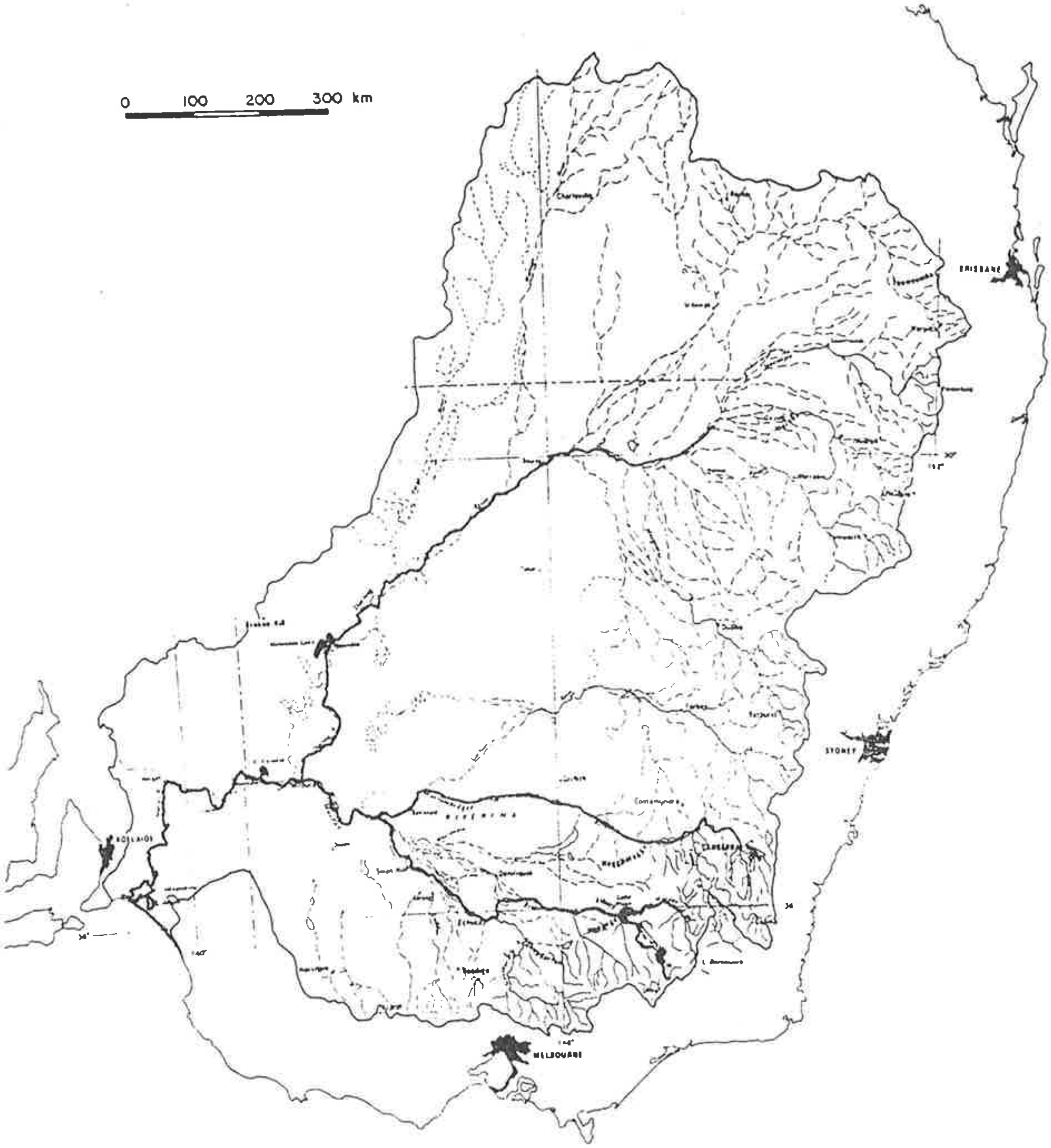

Figure 1.1: Murray-Darling Basin Catchment.

Chapter 2

Background

Figures 2.1 and 2.2 show the extent of the River Murray and its tributaries which are of concern in this study. As can be seen, no major tributary inflow occurs in South Australia. The extent of the entire Murray-Darling Basin is in excess of one million square kilometers or one seventh of the total area of Australia. The Murray-Darling River system totalling some 3780 kilometers of river length is the fourth longest in the world. Although draining only 5% of Australia's total run-off, almost three quarters of all water used for domestic, industrial and agricultural purposes in the nation comes from the Murray-Darling Basin system. (Murray-Darling Basin Ministerial Council, 1987 [25]).

The River Murray Waters Act, 1983 [28] sets out the procedures under which the River Murray is to be operated. Generally, with regard to supply of water to users, the method of operation can be summarized as follows:

During periods when restrictions have not been applied, each of the upper states (New South Wales and Victoria) is entitled to a half share of the sum of the existing water in storage and the expected annual inflow. There are requirements which must be met by the upper states regarding the use and allocation of this water to individual consumers. Of concern to this research is the requirement for New South Wales and Victoria to supply *entitlement* flows to the state of South Australia which must be met from their allocation.

During periods when formal restrictions have been declared the operation of the River is significantly different. Each of the three states (New South Wales, Victoria and South Australia) is entitled to one third (1/3) each of the available water. The equity of this operational procedure is questionable with regard to when restriction are to be declared.

The Act, (Division 5, Clause 104) states: "The Commission may at any time declare a period of restriction ... ending not before the 31st day of May next ensuing ... unless it is satisfied that the quantities of water available for release at the direction of the Commission from the upper river storages will not be, at the 31st day of May then next ensuing, below 2 500 000 megalitres ... unless it resolves that it is unnecessary to do so." (In the above, and throughout this report, unless otherwise specified, any reference to the Commission shall mean the River Murray Commission).

Due to differences in irrigation and cropping practices between the three states the cut-off value for periods of declared restrictions of 2 500 000 megalitres is of concern.

Cropping in the New South Wales irrigation districts essentially comprises annual crops. As these are replanted on an annual basis the irrigators in the New South Wales districts prefer to have as much water as possible *now* and if necessary, not plant in the following year. In South Australia however the major cropping in the irrigation districts consists of citrus and vines. A major time investment is associated with harvestable citrus and wine and table grapes and thus a reliable water supply is required by the South Australian irrigators. There are also significant plantings of stone fruits. Victoria rests between these two extremes as the agriculture is of both annual and permanent type. Urban consumption of Murray water, especially in South Australia, is large as it includes the city of Adelaide. This provides further reason for conservatism.

If a period of restrictions is declared it is usual that each of the States receives less than its usual supply of water. If a better understanding of the hydrologic processes was available, it is possible that a reduction could be made in the value of the forecast cut-off reserve (2 500 000 megalitres) without placing unnecessary risk of failure on the system. This research is aimed at quantifying the risks associated with various values of the forecast cut-off reserve.

The Act also defines how inflows from various tributaries are credited to the upstream states. Tributary inflows upstream of Doctors Point (near Albury) which are considered equally contributed by New South Wales and Victoria comprise the following:

- Net Snowy diversion to Hume catchment

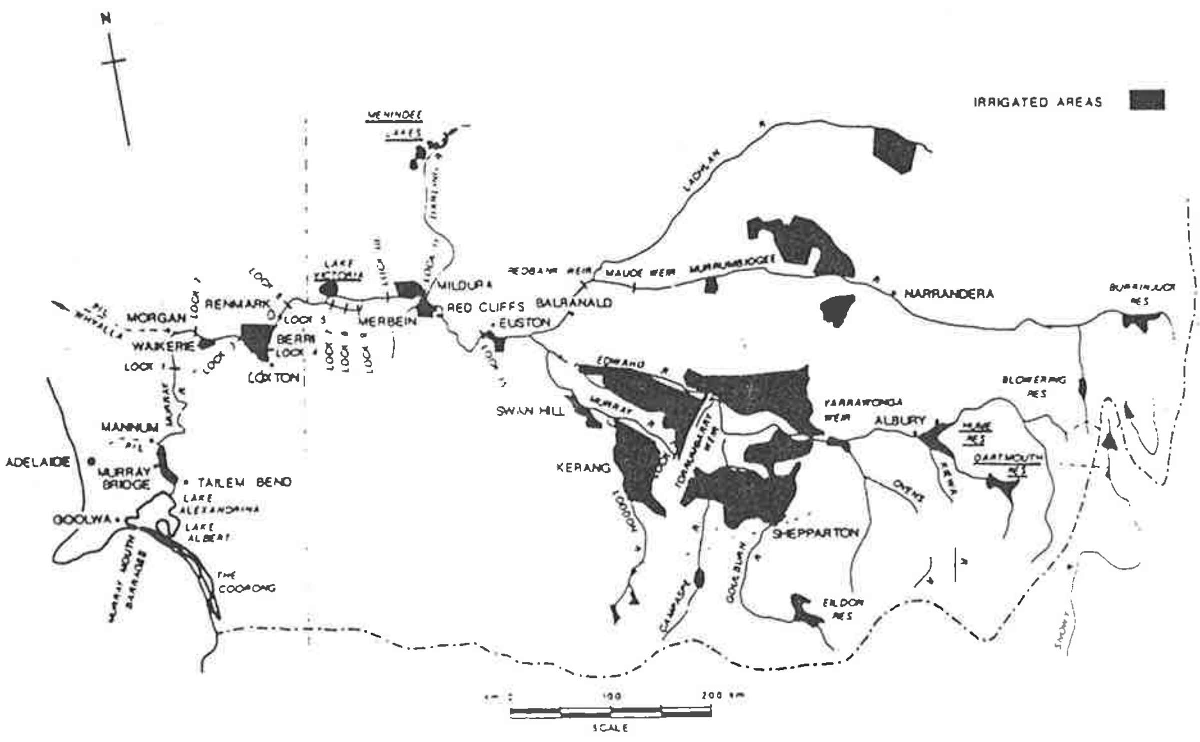

Figure 2.1: The River Murray and major tributaries.

- Inflow to Murray Gates
- Inflow to Dartmouth
- Natural inflow to Hume
- Unregulated inflow to Hume
- Inflow to the Murray from the Kiewa

Inflow from the Murrumbidgee and inflow to Menindee Lakes are considered contributed by New South Wales with the remaining inflows (Ovens, Goulburn, Broken, Campaspe and Loddon) being attributed to Victoria.

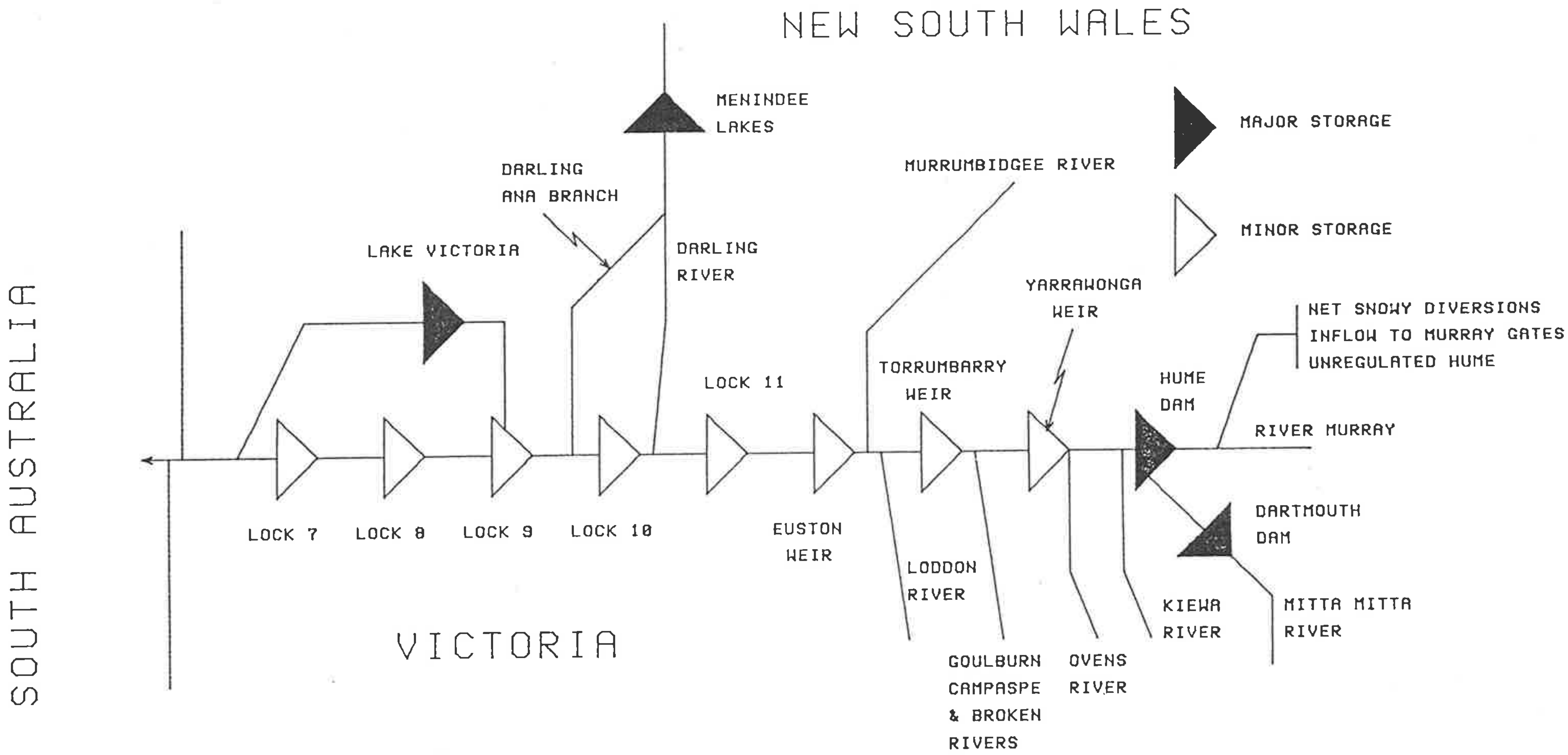

Figure 2.2: Schematic layout of the River Murray.

In general, inflows from Victoria or New South Wales to the Murray are credited to the respective state for its future use. Details of the accounting procedures for water can be found in the River Murray Waters Act (1983) [28] and are comprehensively described in *A Revised Procedure for Sharing River Murray Resources* [29].

During periods when formal restrictions are not enforced, New South Wales and Victoria are entitled to a half share each of the available water with allowance for borrowing and ceding. Water injected by either of the states is considered a credit, and can be extracted downstream. Out of this water the two upper states supply their own irrigators and collectively must supply South Australia with at least *entitlement* flow. (See Appendix A). During periods when formal restrictions have been declared the operating procedures change. Each of the three states is entitled to one third of the available water which is usually less than would be supplied should restrictions not be declared.

As a further complication, each state's perception of the risk associated with receiving less water than desired (defined as system failure) is different because of the differences in their crops as mentioned previously. Because of this, the two upper states tend to consider a reserve value of 2 500 Gl to be conservative whereas South Australia is more likely to consider this value un-conservative.

Should the forecast reserve be permitted to drop to less than 2 500 Gl in a particular year there is an increased risk of system failure in subsequent years. This risk of failure is of more concern to those states with permanent plantings (South Australia and Victoria).

2.1 River Murray Operations

Operation of the River Murray, although maintained within the scope of the River Murray Waters Act, 1983 [28] is a highly variable process. Operations change from year to year in response to climatic variations and on occasion, major policy changes occur. Probably the most dramatic of these have occurred since the incorporation of water quality criteria into the 1983 Act. The changes which have occurred have precipitated a variation of flow régimes within the River and also some of the Commissions storages. (Dartmouth and Hume reservoirs, Menindee Lakes and Lake Victoria). A very general description of operations only is warranted.

As a general rule it is most advisable to release water from the most downstream storage first as it can not be utilized as readily as the upstream impoundments. This also is the case with the River Murray with a few exceptions. Due to channel capacity restrictions between Dartmouth dam and Hume reservoir, and also in the river proper, especially around the Barmah forest region, it is desirable not to make extremely rapid releases because of the likelihood of flooding. It is therefore necessary to release upstream water earlier than may otherwise be desired. This causes a further problem in that if releases from the upstream storages are made for irrigation purposes, and rains subsequently reduce the need for water, there is the potential that the released water may be lost from the system. To assist in reducing the impact of this *inadvertent* loss, the Lake Victoria storage is maintained below full supply level in order to *capture* as much of the loss as possible.

Variation and experimentation with operating policy is not conducted on a full scale basis. The River Murray Commission uses various computer models to simulate the operation of the river. Recently, these models have been used to investigate the possible merits of the *flushing* of Lake Victoria to improve water quality. The flushing cannot always be achieved as it relies on a reasonably high river flow. The technique has now been implemented and has had a significant effect on improvement of water quality in the lake.

Water quality modelling has not been incorporated in the risk analysis for this study. It is considered that during extreme low flow events water quantity assumes a far greater importance.

Critical to the modelling of any operational variations or modifications is the data base used in the model. At present the River Murray Commission uses a historical data base of some 94 years of streamflow, rainfall and evaporation data, modified to represent current levels of development. The disadvantage of such a record is that it may not contain a good distribution, or quantity, of low flow events and thus may not be representative of the range of future flow sequences. This then does not allow a good evaluation of possible risks to each of the three states. To overcome this limitation, a major portion of this study is aimed at extending the historical data set using synthetic hydrology.

Many of the streams which constitute tributary inflow to the Murray, and comprise part of the *modified* historical inflow sequence are themselves subject to operational policies. Thus, the use of historical or synthetically extended data sets will, out of necessity, incorporate the operational policies for the tributaries within them. Thus, any further analysis, including the risk analysis, which has been included in this study, will be influenced by the policies for the tributaries, and the Murray, current at the time of the analysis.

Research in this field of drought risk and management should therefore be considered as a completely dynamic form of analysis. The research and the findings presented in this thesis can be considered merely as a beginning in the pursuit of an *optimum* management strategy.

Chapter 3

Literature Review

This Chapter is organized into three main sections. Firstly, transformation of data is considered. This is a process which must be applied in order to obtain a suitable probability distribution. Synthetic data generation is discussed next and the last section reviews the methods used for analysing the output data, both statistically and operationally.

3.1 Transformation of Data

Unless the historical data sets to be used in the synthetic generation of data are of a convenient, known distribution, there is the need to transform the data. Also, for time series modelling, the data requires the property of additivity; ie. if **X** and **Y** are of a particular distribution, then **X** + **Y** are ot the same distribution. This is true of the normal and some gamma distributions. The most common distributions are the normal, or Gaussian distribution and the Gamma distribution, in particular the Pearson type III variations. Kottegoda (1980) [16] has shown, by example, the inappropriateness of the normal distribution when sampling intervals are small. In this study however, the sample interval is one month. This was considered large enough by the author to adopt the more readily adaptable normal distribution instead of the various Pearson types. If the data to be used in the model is not of this distribution it is necessary to *transform* the data sets. The purpose of this Section is to discuss the various transformations which may need to be made, to overview some of the more common procedures available to perform these transformations and finally to discuss the selected procedures and why these procedures were chosen.

3.1.1 Removal of Temporal Trends

Many trends exist in hydrologic and other natural time series. These trends can exist in the time series data or in the statistics which describe the time series. Trend is usually perceived as a progressive change in value over time; usually a trend in the mean. A trend in the variance may also be observed where the excursions of values about the mean may be increasing or decreasing. Kottegoda, (1980) [16] suggests that trends in hydrological time series are essentially short term, being part of low frequency oscillatory movements. For example changes in catchment land use or climatic factors. Step functions which occur in some hydrologic time series may also be important. There are two basic forms of step function evident in hydrologic data. The first, as demonstrated by Yevjevich, (1976) [31] shows a discontinuity in river salt concentrations due to increased regulation from a water impoundment.

This creates a slope discontinuity. The other form of step function is a dislocation, or jump. This form of step will occur in some evaporation data if the evaporimeter site is changed, or, in streamflow data, due to dramatic river regulation changes caused by major dam construction.

Trends in the statistics describing the time series are usually considered over discrete time intervals. For example, the variance of monthly flow data calculated annually may show an increasing or decreasing value with time.

Removal of trend, as suggested by Kottegoda and other authors is best performed using annual data. This generally allows a physical significance to be attributed to the trend. Removal of the trend can be performed using various methods. Multiple regression analysis can be used to fit an n^{th} order polynomial or other types of equations, (Chatfield (1984) [7]) and a number of various filtering methods can be applied.

3.1.2 Transformation to Normality

For the method of data generation adopted in this study (see Section 3.2) it is essential that the input is normally distributed and that the generation be conducted in a normally distributed environment. The transformation of time series data can be achieved by various methods. These methods fall into one of two categories; bounded or unbounded transformations. In this context, a bounded transformation implies upper and/or lower bounds are placed upon the generated data. The bounded transformation can be useful when applied to non-gravity generated data series such as pumped volumes because there are physical reasons for the upper and lower bounds. The streamflow, rainfall and evaporation data being investigated in this study do not exhibit these constraints with the exception of non-negativity. The bounded class of transformation has not therefore been considered.

For the unbounded transformations, exponential, power and logarithmic based transforms appear the most commonly used. Snyder et. al., (1978) [32] have put forward a generalized system of exponential based transforms of the form:

$$Y = exp^{n}(X + a) \tag{3.1}$$

where:

X is the original data.

Y is the transformed data.

n is the order of the exponentiation (integer only).

a is an origin shift parameter.

Johnson, (1949) [15] has suggested a transformation of the following form:

$$Y = a + b\,\mathcal{G}(\frac{X - c}{d}) \tag{3.2}$$

where:

a, b, c and d are transformation parameters to be estimated.

$\mathcal{G}$ is any desired function.

X and Y are as in equation 3.1.

With $\mathcal{G}$ defined as the natural logarithm ($\log_e$), $a = 0$ and $b = d = 1$, the familiar shifted logarithmic transform,

$$Y = \log_e(X - c) \tag{3.3}$$

is generated. This is the same form as equation 3.1 with $n = -1$.

The power transformations currently in use are most commonly variations of the general shifted power transform of Box and Cox. (Box and Cox, 1964 [5]). This transformation takes the form:

$$Y = \begin{cases} \frac{(X+\tau)^\lambda - 1}{\lambda} & \text{for } \lambda \neq 0 \\ \log_e(X + \tau) & \text{for } \lambda = 0 \end{cases} \tag{3.4}$$

where:

X = observed data.

Y = transformed data.

λ, τ = transformation parameters.

This form of the transformation has the advantage of being continuous as

$$\lim_{\lambda \to 0} \frac{(X + \tau)^\lambda - 1}{\lambda} = \log_e(X + \tau)$$

The derivation of this is given in Appendix B.

Selection of the transformation model was based on two main criteria.

1. The transformation should be readily adaptable to the data being transformed, and thus provide a resultant distribution closely approximating normality. In particular, negative values must be able to be accommodated.
2. It should be reasonably easy to estimate the parameter values.

The power transformation of Box and Cox was selected for transforming all the data used. Optimization of the transformation parameters was relatively simple using a Newton-Raphson solution technique. Also of importance in the selection procedure was the relative ease by which the transformation technique could be compared with the more simple shifted logarithmic transform. Little additional effort was required to preset $\lambda = 0$ and thus produce the log transform.

When using the shifted log transform the Matalas equations (Matalas, 1967 [23]) may be used to preserve the series moments in the untransformed domain. This approach was not used in this study.

3.1.3 Removal of Periodicity

Hydrologic time series exhibit periodic fluctuations caused in the main by seasonal effects generated by the elliptical orbit of the Earth around the sun. Kottegoda, (1980) [16] discusses various methods for removal of periodic components based on Fourier series analysis. Various harmonics of sines and cosines are combined to represent the original series. Yevjevich, (1972) [36] refers to this approach as the parametric method. Generally, the removal of periodicity is concerned with producing a distribution which has a zero mean and unit variance, in this case normally distributed, $N(0,1)$. The non-parametric method involves the estimation of seasonal or monthly means and standard deviations. The series is then standardized by subtracting the the monthly mean and dividing by the monthly standard deviation. The use of the parametric approach is more likely to produce a smaller number of estimated parameters. However, the non-parametric method has been used because of its relative ease of application.

3.2 Generation of Data

Unlike many other fields of engineering, hydrological analysis is often plagued by inadequate data bases. If, for example, it is desired to analyse annual data, then for each year that passes only one additional piece of information can be added to the data set. Of even greater significance is the occurrence of critical periods (those of very large or very small events). These are unlikely to be adequately represented in the *historical* record, especially if that record is short, say less than 20 years. It is not surprising therefore to find reference to synthetic data generation in much of the hydrological literature. Thomas and Fiering (1962) [35] give examples of its use as early as 1914, although the validity of some of the methods used is questionable.

Srikanthan et. al. (1984) [33] suggest four basic approaches to synthetic data generation. The first order Markov type model (Matalas, 1967 [23], Young and Pisano, 1968 [37]) being the most frequently used. Kottegoda (1980) [16] gives a general n^{th} order auto-regressive model for multi-site data generation. The model adopted for this study is a variation of that given by Kottegoda.

In its simplest form, time series data consists of two portions; a constant value or mean and a random component. In this type of model no correlation structure, either spatial or temporal is assumed. Using these assumptions, a univariate synthetic data generator would take the form:

$$y_i = \bar{x} + \varepsilon_i \tag{3.5}$$

where:

$\bar{x}$ = sample mean of the historical data.

ε_i = random component with distribution the same as that of the historical data.

y_i = synthetically generated sequence.

This model however has introduced difficulties, in particular evaluating the distribution of the random component which must match the distribution of the historical sequence. Also, Fiering and Jackson, 1971 [11] state:

> *Because flows that are serially independent do not seem adequate for most hydrologic modelling, we want to include a nonzero deterministic component to reflect persistence in the generation process.*

This then leads to the generalized model presented by Fiering and Jackson, (1971) with deterministic component:

$$d_i = \beta_0 + \beta_1 q_{i-1} + \beta_2 q_{i-2} + \cdots + \beta_m q_{i-m} \tag{3.6}$$

and the overall model structure:

$$q_i = d_i + \varepsilon_i \tag{3.7}$$

In its simplest form this model becomes the lag one, or Markov autoregressive model given by:

$$q_i = \beta_0 + \beta_1 q_{i-1} + \varepsilon_i \tag{3.8}$$

where:

q_i = streamflow data at time i.

d_i = deterministic component at time i.

β_j = constant coefficients evaluated to retain correlation structure.

ε_i = random component with desired distribution.

The Markov model assumes that the entire streamflow history is summarized in the previous data value. In spite of this limiting assumption the lag one model is still widely used. One other assumption of autoregressive modelling is that the data being modelled is stationary; that is, the lower order moments including mean, variance and correlation or persistence between flows does not vary with time.

This model has the problem in that it is not distribution free. That is, the generated data q_i will have the desired distribution only if ε_i is correctly distributed. This leads to some difficulties.

The simplest approach is to transform the data so that it is normally distributed as discussed in Section 3.1.2. This has two principal advantages: (i) generation of normally distributed random deviates is relatively simple and (ii) the sum of normal distributions produces a normal distribution. Instead of using a normal distribution, a gamma distribution can be used for the random component of equation 3.8. This allows the skewness of the historical data to be mimicked in the gamma distribution, possibly eliminating the need for transformation. An approximate gamma distribution with appropriate skewness can be generated. This method suffers two problems; firstly, the sums of gamma variates are not necessarily gamma distributed and secondly, *it is not recommended even with uncommonly long records because of the extreme instability of higher moments* which are used in the generation of the gamma variate (Fiering and Jackson, 1971 [11]).

The models, discussed up to this point, do not readily reproduce some of the very long term persistence which has been observed in hydrologic series. The correlation structure of the lag one autoregressive model is represented by $r_K = r_1^K$ where r_K is the correlation coefficient at lag K where K is an integer lag term. Long term persistence of this is known as the Hurst phenomenon. Studies by Hurst (Loucks et. al., (1981) [21]) in his analysis of the "range of cumulative departures from the mean" statistic (R_n) showed that for natural streams which exhibit long term persistance that $R_n \sim n^H$ where $n =$ the number of years of record and H, the Hurst coefficient lies in the range 0.69 to 0.80. The simple autoregressive models, discussed to date exhibit values of H tending to 0.5 as n becomes large. Mandlebrot and Wallis (1969) [22] showed that fractional Gaussian noise models can produce this long term memory much more satisfactorily than the autoregressive type.

The time step to be used in the generation of data is a further variable which needs to be determined before modelling can begin. Any convenient time period can be used in the generation model but, *in general, the shorter the time interval the more difficult it is to find a suitable model.* (Raudkivi, 1979 [26]).

Monthly, seasonal or annual time steps are commonly used but weekly or daily are also possible. An annual time step is probably the most common method of generation. It is in general less complex as the parameters of generation are constant from one time step to the next. It is also less expensive in terms of computer requirements. However, unless the water system for which the synthetic data is being generated has a critical period significantly longer than one year, it is likely that monthly data will be desired. This will therefore require the disaggregation of the annual generated data into monthly flows. Srikanthan et. al., (1984) [33] suggest the use of the method of fragments using either the key site approach or random selection to achieve this. The problem with disaggregation is that correlations between the first month of one year and the last month of the previous year are not preserved and so in effect a non-homogeneous data set is created. The effects of this can be minimized by selecting the water year to commence with the month of minimum serial correlation.

To overcome these limitations a monthly model can be used. For example, the models of Young and Pisano (Young and Pisano, 1968 [37]) and Fiering and Jackson (Fiering and Jackson, 1971 [11]). There are however several drawbacks with this approach:

1. Different generation parameters are needed for each month.
2. Computational requirements are much larger.
3. The annual statistical properties of the data are not necessarily preserved.

The first two points cannot be rectified. Some attempts have been made to incorporate the annual statistics in the model. For example Stedinger and Pei (1982) [34] propose a monthly-annual streamflow model using an annual streamflow surrogate. This model is best suited to normal and log-normally distributed data and is not readily adapted to the data used in this study.

Type	Description
CARMA	Contemporaneous autoregressive moving average
PARMA	Periodic autoregressive moving average
STARMA	Space-time autoregressive moving average
ARIMA	Autoregressive integrated moving average
ARMAX	Autoregressive moving average with exogenous variables

Table 3.1: Variations of the ARMA model.

Univariate data generation, as discussed so far, is of limited use, especially in this study. Multivariate models are used to generate data at several sites simultaneously and so preserve the autocorrelation structure of each series as well as the cross correlations. In essence, the multivariate data generation models are simply an extension of the univariate case although in practice they become more complicated. Probably the largest class of multivariate data generation models in use in hydrology are the autoregressive moving average (ARMA) models and the various derivatives of these which exist. Table 3.1 lists variations of the ARMA model compiled from Hipel, (1985) [13], Salas, Tabios and Bartolini, (1985) [30] and Camacho, McLeod and Hipel, (1985) [6].

For each of the variations listed in Table 3.1 various combinations of autoregressive and/or moving average terms can be used. The purpose of the moving average is to identify and remove trends in the time series. The procedure fits a polynomial of varying degree to selected segments of the time series. This produces a least squares fit to the data and the *smoothed* value of the mid point is used as the detrended data. Trend detection and removal as discussed in Section 3.1.1 is considered more reliable than the moving average analysis (Yevjevich, 1972 [36]). This list however is by no means exhaustive. A further class of autoregressive type models for use with continuous variate time series modelling is discussed in Lewis, (1985) [20]. These are the various families of exponential autoregressive or EAR models.

The first order autoregressive model (ARMA(1,0)) proposed by Matalas, (1967) [23] is probably the most widely used multivariate generating model in hydrology.

$$x_{i+1} = Ax_i + B\varepsilon_{i+1} \tag{3.9}$$

where:

x_{i+1}, x_i are $(m \times 1)$ matrices of generated data at times $i+1$ and i respectively.

ε_{i+1} is a $(m \times 1)$ matrix of random deviates.

A, B are $(m \times m)$ matrices to preserve serial and cross correlation structure.

m is the number of *sites* in the multivariate generation.

Kottegoda, (1980) [16] further extends this model to n^{th} order, where n represents the number of lag terms in respect to serial and cross correlations used in the model.

$$x_t = \sum_{l=1}^{p} A_l x_{t-l} + B\varepsilon_t \tag{3.10}$$

Here A_l and B have the same purpose as in equation 3.9 and p denotes the number of lag terms to be used. Development of the solution to A_l and B as well as methods for estimating p are given in Kottegoda.

The model proposed by Matalas, (equation 3.9) can be used with monthly, seasonal, annual or any other repeating cycle of data. Mixed data types can not be readily incorporated. The same difficulty exists with Kottegoda's model (equation 3.10).

Srikanthan et. al., (1984) [33] discuss the problems associated with this form of modelling, the major one being preservation of parameters between data types. For example, if a monthly model is chosen, statistics such as annual correlations are not modelled.

A further application of the data generation process is to *infill* missing data. Care should be taken in this process. The use of synthetic data generation models of this type to *infill* data sets by substituting transformed historical data in the $[\varepsilon_t]$ vector has been carried out by some researchers (e.g. Barratt and Close, 1983 [3]).

3.3 Data Testing

Significance testing of various data sets has been conducted for two purposes. In the first instance statistical tests have been performed to evaluate the statistical significance of various properties of the historical data. Some temporal trends were identified in much of the data used in this research. These trends were tested for significance at predetermined levels.

Depending upon the type of trend removal to be undertaken various tests are needed. If a simple regression analysis is to be performed it is satisfactory to accept or reject a hypothesis on the best coefficient of determination. If a more complex analysis is to be performed, involving many terms for example using multiple regression, or filtering methods, testing for the significance of additional parameters in the trend equation needs to be done. In this research, simple regression has been used.

Some difficulties exist with this testing. In the general regression analysis where:

$$Y = X\beta + \varepsilon \tag{3.11}$$

and

Y is a vector of dependent variables.

X is a matrix of independent variables.

β is a vector of coefficients.

ε is a vector of random errors.

In the regression analysis, β is estimated by b and the errors are minimized. Note however that: (Draper and Smith, 1966 [9])

> *An assumption that the errors ε are normally distributed is* not *required in order to obtain the estimates b but it* is *required later in order to make tests which depend on the assumptions of normality, such as t- or F- tests, or for obtaining confidence intervals based on the t- and F- distributions.*

In the transformation process, testing for normality is required as successive transformations are performed. This is discussed in Chapter 4. Testing for normality can be achieved either graphically or analytically. Graphical testing is not a realistic consideration in this study due to the large number of tests needed to be performed. LaRiccia (1986) [18] reviews three test statistics as goodness-of-fit tests for normality compared with skewness and kurtosis estimates. These are different sums of squared L-statistics which under the null hypothesis (the distribution is normal) converge to the Chi-squared distribution.

Significance testing has also been conducted to compare the statistics of the generated data with those of the historical data set. This again suffers the normality assumption problems. Data comparisons could have been made using the transformed historical data and the *raw* synthetically generated data, thus meaning that both data sets would have been normally distributed. However moment transformation equations (Matalas, 1967 [23]) have not been used as discussed earlier, and it was therefore more relevant to test the synthetic data in its fully back transformed state, thereby allowing for the errors incurred by generating in the transformed domain. The tests which have been performed are discussed in Chapter 7. The means of the various statistics from the replicates of generated data are compared with the historical data and also with the data sets generated using the various methods which have been used as comparisons.

The statistical tests which have been conducted have been taken from Crow, Davis and Maxfield, (1960) [8].

Statistical testing is not the only requirement for accepting, or rejecting the generated data. Operational testing also needs to be done. For this research, operational tests were effected by using the River Murray Commission's monthly simulation model of the River Murray (MSM). This is not an *absolute* test as there are many assumptions and simplifications in the simulation model. It is however the best tool currently available for the analysis. Limited access, and time, were constraints to this testing process. As a final test of the data a low flow frequency analysis using non-overlapping and overlapping sequences (Srikanthan et. al., 1984 [33]) was conducted. This has only been conducted for the natural inflows to Hume catchment.

Chapter 4

Data Transformations

Three basic transformations have been performed on each of the data sets used in the synthetic generation process adopted in this study. These are the removal of trends over time, transformation of the data to approximate a normal distribution and standardizing to zero mean and unit variance.

The data used in this research was supplied by the River Murray Commission as 17 sets of monthly data, one for each major tributary, (11 in all), three rainfall and three evaporation sets. They are:

- Net Snowy diversion to Hume.
- Inflows to Murray Gates.
- Inflow to Dartmouth.
- Inflow to Hume.

- Inflow from the Kiewa River.
- Unregulated inflow to Hume.
- Inflow from the Ovens River.
- Inflow from the Murrumbidgee River.
- Inflow to Menindee Lakes.
- Total inflow from Goulburn, Broken and Campaspe Rivers.
- Inflows from the Loddon River.
- Deniliquin rainfall.
- Kerang Post Office rainfall.
- Tocumwal rainfall.
- Hume evaporation.
- Menindee Lakes evaporation.
- Lake Victoria evaporation.

Each was complete for 94 years starting in May, 1891 and finishing in April, 1985. These data sets have been adjusted to represent current development along the River. Correlation between December and January data was generally less than between the other months and it was therefore advantageous to synthetically generate data on a January to December basis. Three practical methods can be used to create *complete* years. The first eight months and the last four months of the record can be removed leaving a 93 year record. The first eight months can be used as the last eight months of the record, producing 94 years of data or, the monthly means can be used to replace the missing data. It was considered desirable to preserve as much of the auto and spatial correlation structure of the historical data as possible. Therefore, the third option, the replacement of missing data with monthly means was used, producing a total of 95 years of record, complete as January to December monthly data.

4.1 Removal of Trends

Generally, a hydrologic time series may exhibit some trend with time for one or more of its statistical properties. The most common of these is the mean. For example, the flow volume in a particular river may be increasing over the years due to increased impervious areas in the catchment caused by a growing population. Greenhouse induced effects and other long term climatic changes have not been included explicitly in this analysis. At the present stage of knowledge, errors in the data records are more likely greater than variations attributable to greenhouse phenomena. Also of interest (Barratt and Close 1983 [2]) is the trend with time of the variance of the time series; namely, are the data points which constitute the series exhibiting larger or smaller excursions from the mean value? The purpose of a trend analysis is to investigate the nature of the trends and remove them if they are statistically significant.

Noteworthy at this point is the fact that all the data transformations conducted were done so on individual monthly data. The purpose of this approach was to obtain the best approximation to a normal distribution. It can be argued that the lack of physical significance, especially with trend analysis should be a deterrent to the monthly approach. However, this approach has been used as it constitutes a more statistically sound analysis even though it lacks some physical explanation.

The *historical* data supplied by the River Murray Commission had already been *corrected* for developments in the catchment and therefore negligible trends were expected. It was decided not to investigate trends in the variance but to look at trends in the mean only. Visual inspection of the time series plots of the monthly data showed negligible change in the variance over time. Some typical time series plots are shown in Appendix C.

Three types of trend model have been used to fit the mean of the data:

1) Linear	$y = a_1 + b_1 x$
2) Exponential	$y = a_2 e^{b_2 x}$
3) Power	$y = a_3 x^{b_3}$

The general shapes of these models are shown in Figures 4.1 (a),(b) and (c). The least squares method is applied to the original or modified equations (Hewlett-Packard 1981 [1]) to obtain a best estimate of the trend parameters a_j and b_j $(j = 1, \ldots, 3)$.

The solution of a_j and b_j is found by solving for A and B in the following equations:

$$An + B\sum X_i = \sum Y_i \tag{4.1}$$

$$A\sum X_i + B\sum X_i^2 = \sum Y_i X_i \tag{4.2}$$

where: n =the number of observations and A, B, X_i and Y_i are defined in the table below.

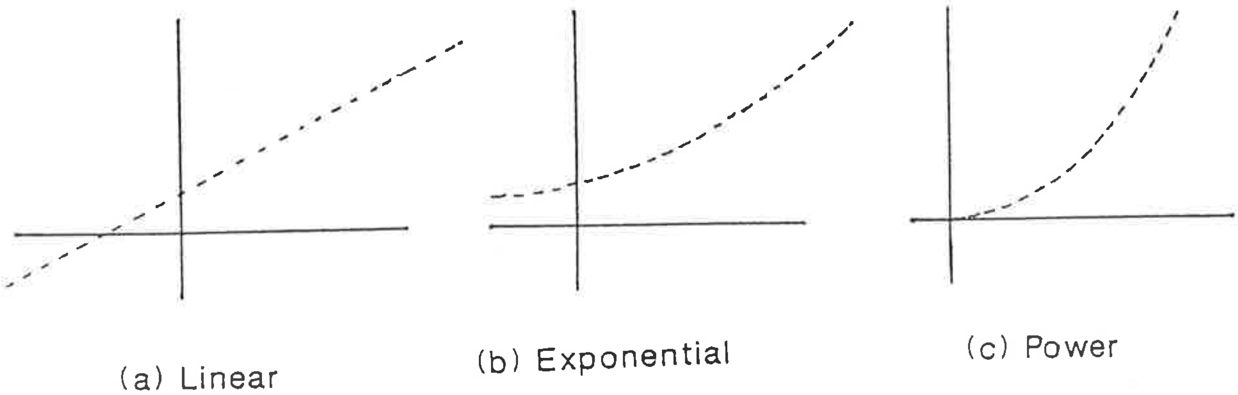

Figure 4.1: Trend Model Form.

Trend Model	A	B	X_i	Y_i
Linear	a_1	b_1	x_i	y_i
Exponential	$\log_e a_2$	b_2	x_i	$\log_e y_i$
Power	$\log_e a_3$	b_3	$\log_e x_i$	$\log_e y_i$

and the coefficient of determination r^2 is evaluated as:

$$r^2 = \frac{A\sum Y_i + B\sum X_iY_i - 1/n(\sum Y_i)^2}{\sum(Y_i^2) - 1/n(\sum Y_i^2)} \tag{4.3}$$

A FORTRAN program was written to evaluate a_j,b_j and r^2 for all of the data. As only two parameters are used for each of the trend models it is not necessary to investigate the improvement in the explanation of the stochastic component with an increase in parameters as is the case with a general polynomial model. Selection of the best trend model was based entirely on the coefficient of determination, r^2. The most significant or largest value of r^2 indicated the model type to be used. This value was then tested for significance at the 5% level. If the value of r^2 was not significant at this level, no trend removal was performed. Values of the regression parameters and the coefficient of determination for each of the data sets, along with indication of whether a trend removal was conducted are given in in Appendix D.

The least squares method applied here is not strictly correct. Of the three general assumptions (Kreyszig 1979 [17]) of the least squares method, only one is strictly satisfied.

Assumption 1 The n values, $x_1, \ldots, x_n$ of the sample $(x_1, y_1), \ldots, (x_n, y_n)$ are not all equal.

note; x_i is the independent variable (in this analysis, the year)

y_i is the dependent variable (the historic observation corresponding to the year)

Assumption 2 For each fixed x the random variable Y is normal with mean

$$\mu(x) = \alpha + \beta x \tag{4.4}$$

and variance σ^2 which is independent of x.

Assumption 3 The n performances of the experiment by which we obtain a sample $(x_1, y_1), \ldots, (x_n, y_n)$ are independent, meaning that the data in a given month is independent of data in the same month in a different year.

Strictly, only assumption 1 is satisfied. The years are in fact all different. Some correlation between observations from one year to the next is evident, therefore assumption 3 is not satisfied. However, the correlation is negligible for data which is more than one year distant (more than one sample away). Assumption 2 is not satisfied. The random variable Y is not normal (transformation to normality is discussed in Section 4.2). This is not a difficulty when applying the least squares method. The problems arise in the use of statistical tests as discussed in Chapter 3. β in equation 4.4 is termed the regression coefficient of the population. Under the assumptions 1 to 3 the maximum likelihood estimate of β is the sample regression coefficient b, or B in equations 4.1, 4.2 and 4.3. As the assumptions are not all satisfied, this is not the case and the value of the regression coefficient calculated from the sample is not necessarily the best estimate for the population.

However, the least squares method is widely used on many sets of data which do not satisfy the assumptions given above. This is also the case in this study.

4.2 Transformation to a Normal Distribution

One of the necessities of the auto-regressive data generation process (see Chapter 5) is that addition of one data set to another results in a data set with the same distribution as that of the original two. This is the property of additivity. This property is only strictly valid with the normal or Gaussian distribution, meaning that the addition of data from one normal distribution to data from another will result in a third data set, the distribution of which will be normal. In some cases the addition of two gamma distributions will result in a third gamma distribution but this is not always the case. Thus, in the auto-regressive type of model, where the current event is dependent upon the previous history the data must be transformed to at least a best approximation to the normal distribution.

Srikanthan et. al., (1984) [33] suggest that the two most common transformations in use are the log-normal and the Box-Cox transformations, and the several variations of these which exist. One test of normality is that the coefficient of skewness should not be significantly different from zero. The coefficient of skewness is defined as the third moment of the distribution divided by the second moment raised to the power 1.5. This can be represented mathematically as:

$$C_s = \frac{[m_3]}{[m_2]^{1.5}} \tag{4.5}$$

where:

C_s = coefficient of skewness.

$[m_3]$ = third moment of the distribution about the mean.

$[m_2]$ = second moment of the distribution about the mean.

To further refine the normality test, a test for the coefficient of kurtosis can be made. The kurtosis provides a definition of the peakedness of the probability distribution function. The coefficient of kurtosis is defined as the fourth moment of the distribution divided by the second moment squared, and has a value of three for a normal distribution. It is written mathematically as:

$$C_k = \frac{[m_4]}{[m_2]^2} \tag{4.6}$$

where:

C_k = coefficient of kurtosis.

$[m_4]$ = fourth moment of the distribution about the mean.

For all the sites considered in the synthetic generation, both monthly and annual data exhibited a coefficient of skewness which was significantly different from zero. All data therefore required transformation to better approximate a normal distribution. The Box-Cox transformation (Box and Cox 1964 [5]) has been used in this study as the primary transformation for all data sets. The shifted log transform has been used for comparison. The Box-Cox transformation takes the following form:

$$y_{ij} = \begin{cases} \frac{(x_{ij}+\tau_{ij})^{\lambda_{ij}}-1}{\lambda_{ij}} & \text{for } \lambda_{ij} \neq 0 \\ \log_e(x_{ij}+\tau_{ij}) & \text{for } \lambda_{ij} = 0 \end{cases} \tag{4.7}$$

where:

x_{ij} = observed data after trend removal at site i in month j.

y_{ij} = transformed data at site i in month j.

λ_{ij}, τ_{ij} = transformation parameters at site i in month j.

In equation 4.7, note that as λ_{ij} tends to zero, the power transformation tends to the log transformation. (See Appendix B for derivation).

A simplified version of the transformation of equation 4.7 is obtained by setting τ_{ij} to equal zero for all i and j. Srikanthan et. al., (1984) [33] suggest the Box-Cox transform of the form:

$$y_{ij} = \begin{cases} x_{ij}^{\lambda_{ij}} & \text{for } \lambda_{ij} \neq 0 \\ \log_e x_{ij} & \text{for } \lambda_{ij} = 0 \end{cases} \tag{4.8}$$

The advantage of the transformation of equation 4.7 is that with two parameters to be estimated, λ_{ij} and τ_{ij}, it is easier to obtain a transformation where the transformed data exhibits a coefficient of skewness of zero, and a coefficient of kurtosis as close as possible to three. Significance testing of skewness and kurtosis in the transformation process was not considered necessary as the process involved forcing the skewness to zero and selecting the best possible value for kurtosis.

Attempts to use maximum likelihood estimates for the parameters λ_{ij} and τ_{ij} proved to be impractical.

A FORTRAN program was written to evaluate these parameters using a bounded Newton-Raphson technique. This was followed by a manual fine-tuning process where necessary (see Section 4.2.2).

4.2.1 Parameter Estimates and Data Transforms

Prior to commencing the procedure for estimating the transformation parameters it was recognised that bounds would need to be placed on both λ_{ij} and τ_{ij}. Obviously, problems exist with equation 4.7 if the value of $(x_{ij} + \tau_{ij})$ is zero or negative. If λ_{ij} is zero the transformation is not defined. If λ_{ij} is not zero, but is a real value, the transformed data becomes complex, which although definable, is not useful. To eliminate this problem, τ_{ij} was constrained to be not less than the smallest value of $(-x_{ij} + 0.1)$. Upper and lower bounds on λ_{ij} and an upper bound on τ_{ij} also needed to be placed to preserve the structure of the distribution. These bounds were placed arbitrarily as given below:

$$-1.0 \leq \lambda_{ij} \leq 2.0 \tag{4.9}$$

$$(-x_{ij}^{s} + 0.1) \leq \tau_{ij} \leq 2.0 * x_{ij}^{l} \tag{4.10}$$

where:

x_{ij}^{s} = smallest value of x_{ij}.

x_{ij}^{l} = largest value of x_{ij}.

A total of 156 (i.e. 13 sites $\times$ 12 months of the year) data sets, each of 95 values were transformed using equation 4.7 with the restrictions of equations 4.9 and 4.10. Final fine-tuning required only six data sets to have a value of λ_{ij} to be less than -1.0. (A value of -1.5 was the lowest used). The bounds for τ_{ij} were not exceeded. The transformation parameters for each data set are shown in Appendix E.

Not all data can be transformed to a normal distribution with this style of transformation even when the transformation parameters are unbounded (except for a lower bound on τ_{ij}). Ten streamflow and three rainfall monthly data sets were transformed using this method. The evaporation data from Hume reservoir, Menindee Lakes and Lake Victoria, along with the streamflow data for the Loddon River did not transform successfully and so they were not used in the multi-site synthetic data generation. For those sets which were transformed, the following trends were observed:

1. A reduction in the value of λ_{ij} required a reduction in the value of τ_{ij} to achieve zero skewness.
2. The reduction of λ_{ij} and adjustment of τ_{ij} to obtain zero skewness caused a reduction in the coefficient of kurtosis.

Thus, it may not always be possible to achieve the desired distribution. For all the transformations performed, the parameter values chosen were those which achieved a coefficient of skewness equal to zero and a coefficient of kurtosis as close as possible to three was selected.

Further complications arise with the inverse transformation which must be applied after data generation. This is discussed in Chapter 5.

4.2.2 Evaluation of Transformation Parameters

A bounded Newton-Raphson solution technique was used to evaluate the parameters λ_{ij} and τ_{ij} of equation 4.7. In order to keep programming simple, a two dimensional solution algorithm was used. The method used is given below:

1. A value of λ_{ij} was selected. (The starting value used was the upper bound)
2. A value of τ_{ij} was selected. (The starting value used was the lower bound)
3. The coefficient of skewness was estimated.
4. Newton-Raphson method was applied to determine new parameter values to achieve a better value of the skewness coefficient. If an increase in τ_{ij} was indicated, this increase was limited to 200.0. If a decrease was indicated the maximum step size was set to 150.0[1]. The upper and lower bounds, discussed in Section 4.2.1,

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[1]The value of skewness, as a function of the transformation parameters is not well behaved, with the slope of the function being at, or near horizontal. For this reason it became necessary to incorporate forward and backward limits, different from each other to achieve

also were not exceeded. If the slope of the function was calculated to be zero, the slope was arbitrarily set to 0.0001 and the process repeated.

5. Once a value of zero skewness was achieved, the coefficient of kurtosis was calculated. If this was sufficiently close to three, the process was exited. If not, a new value of λ_{ij} was selected (decrement the previous value by 0.01) and the process repeated.

The process was then repeated for all data sets, and the values of λ_{ij} and τ_{ij} producing a best approximation to a normal distribution were selected.

It proved impossible to fully automate this selection procedure with the process described. For those data sets which would not transform well, a fine-tuning process was undertaken. A FORTRAN program was written which allowed the user to interactively select any data set to be analysed and then adjust the parameters of the transformation until acceptable distributions were achieved. It was not possible to achieve any acceptable transformations for the Loddon River. This is a highly regulated stream and most of the flows are zero.

4.3 Data Standardization

As discussed in Section 4.2, it is necessary to have all data sets exhibiting the same value of mean. To simplify data generation, it is best to have a mean of zero, and a variance of unity. After transformation with the Box-Cox transform the data was standardized. This is usually achieved by subtracting

a solution.

the mean and dividing by the standard deviation of the distribution, as shown below. Yevjevich (1972) [36] refers to this standardization of data as non-parametric removal of periodicity.

$$mean\ (\bar{x}) = \frac{1}{n}\sum_{i=1}^{n} x_i \tag{4.11}$$

$$standard\ deviation\ (s) = \left(\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2\right)^{0.5} \tag{4.12}$$

$$standardized\ data\ (\hat{x}) = \frac{x - \bar{x}}{s} \tag{4.13}$$

where:

n = number of observations

x_i = observation i

This method proved to be unsatisfactory. Even when using double precision in the FORTRAN program written to perform the standardization, errors due to round off would occur when calculating the standard deviation. A two stage process was therefore used. The mean was first evaluated and subtracted from each observation. The standard deviation was then calculated from the new data and this value was then used to produce the final data set to be used in the synthetic generation model.

Chapter 5

Synthetic Data Generation

5.1 Data Generation Model

Appendix G shows correlograms for the auto-correlation for various data sets using fully transformed data. The month of February has been used for the correlograms as these correlations are the most significant and, February has the smallest mean inflows to the Murray, therefore being the most important month in this low-flow oriented study.

As the lag 12 correlations were significant it was decided that they should be incorporated within the model as they should help to preserve the annual statistics in a monthly streamflow generation model. This was considered a better alternative than using a model of the type proposed by Stedinger and Pei (1982) [34] who make each monthly flow depend on the flow in the previous month and the previous year. The annual streamflow surrogates they use are not well suited to the power type transformations used in this study. The monthly model using lag 1 and lag 12 terms used in this study takes the following form:

$$[Y_t^q] = [A_t][Y_{t-1}^q] + [B_t][Y_t^{q-1}] + [C_t][\varepsilon_t^q] \tag{5.1}$$

where:

$[Y_t^q]$ is a vector of size p of detrended, normalized and standardized data for month t in year q.

$[\varepsilon_t^q]$ is a vector of size p of independent random variables distributed $N(0,1)$ for month t in year q.

$[A_t], [B_t], [C_t]$ are $p \times p$ matrices of constant coefficients (on a monthly basis, $t = 1, \ldots, 12$) to preserve serial and cross correlations.

q is the relevant year.

t is the relevant month.

p is the number of sites used in the model.

5.2 Use of Data

As mentioned in the Introduction, the data supplied by the River Murray Commission comprised ten sets of monthly streamflow data, three sets of monthly rainfall data and three sets of monthly evaporation data.

Initial analysis of the evaporation data showed some significant trends with time. This can be seen in the plots of evaporation data shown in Appendix C. One possible explanation for this is a long term trend in weather patterns. However, further investigation showed that, as with much evaporation data currently available, these data sets were suspect. The Engineering and Water Supply Department meteorological station report for Lake Victoria [10] cites some classic problems with the evaporimeter at that site. For a period of about ten years after initial installation, the readings could not be considered accurate as during this drought period rabbits were frequently observed drinking from the evaporation pan. A guard was eventually installed to prevent this occurring, but no estimates were made of the subsequent reduction in evaporation. Later, the pan was replaced and moved to a more exposed location. *Because of these problems, no evaporation data has been used in the multisite synthetic generation process.*

All remaining data were considered reasonable and were to be used in the synthetic generation process. However, it was not possible to transform the Loddon River flow data to a normal distribution using the transformation procedures discussed in Chapter 4. The Loddon is an extremely regulated river and most of the observations indicate *zero* flow. This is shown well in the January plot of historical Loddon River flows in Appendix C. Evaporation losses, although not small are only slightly correlated with the other data. It was decided therefore that these four data sets (Loddon flows and the three evaporation series) would be generated in a different manner (see Section 5.7). Thus a total of 13 sites have been used in the synthetic generation procedure; ten streamflow and three rainfall.

Most of the ten streamflow data sets used are from streams with some degree of regulation. This causes two problems:

- In general, regulated data does not transform to a normal distribution as well as unregulated data meaning that the assumptions of Section 4.1 are not strictly adhered to.
- The regulation is a function of the present day mode of operation. Synthetic generation of this type of data produces a data set which is only useful if essentially the same operating procedures are being used.

The storage/behavior analysis of the River (see Chapter 6) was undertaken using the River Murray Commissions monthly simulation model (**MSM**) of the River Murray. This model requires as input the monthly streamflow, rainfall and evaporation data as was provided for this study. Synthetic generation of the regulated streamflows, although reflecting current operational strategies of the tributaries and storages was considered to be the most satisfactory method available to produce the records required.

5.3 Estimation of Parameters

For the model used (equation 5.1) the entries in the $[A_t]$, $[B_t]$, and $[C_t]$ matrices must be estimated. These entries are correlation parameters which maintain the correlation structure during the generation process. Each of these matrices (a total of 36 as there must be one for each month) is dimensioned 13×13 meaning that more than *6000* parameters must be estimated. These entries are calculated from the $[M]$ matrices defined in Table 5.1. There are 60 of these matrices, each with dimensions 13×13. However, as the main objective is the generation of flows with monthly and annual statistics which best match those of the historical series, the large number of parameters involved is not a problem.

Matrix	Estimated Statistic	Lead Diagonal ($i = j$)	Off Diagonal ($i \neq j$)
$[M_0^t]$	$\frac{1}{n-1} \sum_{q=1}^{n} x_{t-1}^{q^i} x_{t-1}^{q^j}$	1.0	lag 0 cross correlations for the previous month
$[M_1^t]$	$\frac{1}{n-1} \sum_{q=1}^{n} x_t^{q^i} x_{t-1}^{q^j}$	lag 1 serial correlations	lag 1 cross correlations
$[M_2^t]$	$\frac{1}{n-2} \sum_{q=2}^{n} x_t^{(q-1)^i} x_{t-1}^{q^j}$	lead 11 serial correlations	lead 11 cross correlations
$[M_3^t]$	$\frac{1}{n-2} \sum_{q=2}^{n} x_t^{q^i} x_t^{(q-1)^j}$	lag 12 serial correlations	lag 12 cross correlations
$[M_4^t]$	$\frac{1}{n-1} \sum_{q=1}^{n} x_t^{q^i} x_t^{q^j}$	1.0	lag 0 cross correlations

where $x_t^{q^i}$ is defined as the flow at site i in month t of year q after detrending, transformation and standardization.

note: the $[M_2^t]$ statistics are termed *lead* to maintain a constant terminology; compare for the $[M_3^t]$ statistic.

Table 5.1: $[M]$ matrix definitions.

For each month, January to December there are five $[M]$ matrices to be estimated. The term ***estimated*** is used as the entries are correlation coefficients which are "estimated" from the sample. They are not the true, or population coefficients.

5.4 Evaluation of the $[A]$,$[B]$, and $[C]$ Matrices

Appendix B gives the derivation of relationships between the $[A_t]$,$[B_t]$, and $[C_t]$ matrices and the $[M]$ matrices. All entries in the $[M]$ matrices are known and hence the evaluation of $[A_t]$ and $[B_t]$ is straight forward. However, evaluation of $[C_t]$ is not as simple. As all entries on the right hand side of equation B.8 in Appendix B are known, it can be rewritten as:

$$[C_t][C_t]^T = [D_t] \tag{5.2}$$

where t indicates the particular month and ^{T} indicates the matrix transpose.

Young and Pisano (1968) [37] provide a solution method for $[C_t]$ which works on the principle that $[D_t]$ must be symmetric. Further to this, it can be assumed that $[C_t]$ is lower triangle thus allowing a recursive solution process for all entries. A FORTRAN program was written to calculate the entries in the $[C_t]$ matrices using this recursive procedure. This procedure was checked by evaluating equation 5.2. During the checking procedures, all enteries used to generate these matrices were considered significant. The significance testing was applied during the production runs.

5.5 Data Generation

After all parameters have been estimated the generation process can be applied using equation 5.1. A FORTRAN program was written to apply this equation to the data. The following subsections detail the principles involved in the running of the model.

5.5.1 Assumptions

To generate data using equation 5.1 it is essential that the vectors and matrix-vector products

$$[Y_t^q],\ [A_t][Y_{t-1}^q],\ [B_t][Y_t^{q-1}]\ and\ [C_t][\varepsilon_t^q]$$

have the same distribution, thus implying that the $[Y]$ vectors and the $[\varepsilon]$ vector have the same distribution. In this study, each of the vectors must be from a normal or Gaussian distribution and have zero mean. This is not strictly adhered to as it is unlikely that the transformation processes discussed in Chapter 4 will provide a *perfect* normal distribution. It has also been assumed that the data is stationary.

5.5.2 Random Numbers

A major contribution to the quality of the results is made by the quality of the random numbers used in the modelling process. These form the basic starting data set to which the influence of last months and last years data is added. IMSL (1985) [14] subroutine **GGNML**, a zero mean, unit variance Gaussian distributed random number generator was used to generate the $[\varepsilon_t^q]$

vector. A seed is input and 100 random numbers generated, as well as a new seed. Only the last 13 numbers were used to create the $[\varepsilon_t^q]$ vector and the others discarded. This was to eliminate any effect that the seed may have on the generation itself. This process was repeated for each cycle of the model, using the self-generated seed after the first cycle.

Care is needed to ensure that the entries in $[\varepsilon_t^q]$ are indeed random and normal. The need for normality has been discussed. Randomness is also important. With reference to the derivation of the $[A_t]$, $[B_t]$, and $[C_t]$ matrices (see Appendix B) the expectations evaluate to zero *because* the numbers are random and therefore have *no* correlation structure.

5.5.3 Generation Methods

Basically, two methods can be used to generate the synthetic data. Either of these methods can be selected within the FORTRAN program written to generate the data:

method 1 Generate a large number of years of data in one continuous process.

method 2 Generate many sets of data of shorter duration. This was set to 95 years, being equal in length to the historical record.

For this study, method 2 was used as this eliminates variation in the standard errors of statistical parameter estimates between the historical and synthetic data when the quality of generated data is being evaluated. A total of 84 replicates of 95 years of data were generated producing 7980 years of monthly data.

A set of initial values ($[Y_t^0]$ for $t = 1, \ldots, 12$) is required to start the synthetic streamflow generator as is indicated in equation 5.1. Historical data records are used as the seeds as these must, by necessity input as much of the general correlation structure as possible. However, as with the random number generator it is also desirable to minimise the numerical effect of the initial values on the generation. This is achieved by discarding the first few values generated. Twelve months of historical data for each of the 13 sites is required as the initializing values for each separate generation. It was decided to generate data sets with approximately 20% longer length of record than the historical data and discard the first 20% of the generated record. To simplify matters, 115 years of data were generated for each replicate and the first 20 years discarded. Of course this procedure is not followed when the model is in forecasting mode (discussed in Section 5.8).

5.6 Inverse Data Transformations

There are three steps involved in the back transformation of the data. These are the inverse of the transformations discussed in Chapter 4. The three steps are:

1. Rescale (put back mean and variance).
2. Back transform.
3. Retrend.

Of the three inverse transformations items 1 and 3 above are straight forward. Some minor difficulties such as production of negative flows may arise but these are handled with relative ease, and the consequences are not major. (See Section 5.6.2). Application of the inverse Box-Cox transformation (item 2) is not as straight forward.

5.6.1 The Inverse Box-Cox Transform

For the Box-Cox transformation (Equation 4.7) used in this study the following inverse transforms apply:

$$Z_{ij} = \begin{cases} [(y_{ij} \times \lambda_{ij}) + 1]^{1/\lambda_{ij}} - \tau_{ij} & \text{for } \lambda_{ij} \neq 0 \\ e^{y_{ij}} - \tau_{ij} & \text{for } \lambda_{ij} = 0 \end{cases} \tag{5.3}$$

where:

Z_{ij} = the back transformed data.

For the case when $\lambda_{ij} = 0$, the inverse transformation is defined for all y_{ij} and has an asymptotic lower bound of -τ_{ij}. If however, $\lambda_{ij} \neq 0$, the following two particular difficulties are encountered.

1. If $[(y_{ij} \times \lambda_{ij}) + 1] \leq 0$ and $1/\lambda_{ij}$ is non-integer, the transformation is undefined. There are at least two ways to overcome this difficulty —

   (a) arbitrarily assign a small positive value to the expression, raise this value to the specified power and subtract the shift term

   (b) neglect the above expression completely and assign a value of $-\tau_{ij}$ to the output

   The second method, (b) was used in this study. The use of method (a) will produce a larger value on output than that produced by method (b) and as this is arbitrarily inflated it should be avoided. Also method (b) provides the same lower bound as does the $\lambda_{ij} = 0$ case.

2. Less obvious are the effects of small, positive values of λ_{ij}. If λ_{ij} is small and positive, the power term is large. Note that at this stage in the inverse transformation procedure the mean and standard deviation have already been put back and thus y_{ij} is no longer distributed $(0, 1)$. Hence this back transformation can produce an unrealistically large value. This problem was handled by placing bounds on the generated data as described in the following section.

5.6.2 Placement of Bounds

Due to the difficulties discussed above, it is necessary to place bounds on the generated data. In the case of the streamflow and rainfall data generated in this study the obvious lower bound is zero. Truncating the series to zero does have some effect on the statistics of the series generated, but as this case occurred on only relatively few occasions the effect was not significant. In this regard the Net Snowy diversion to Hume catchment data (MDSNWY) is different. In some months the diversion is from the Hume catchment to the Snowy scheme and thus the values are negative. No zero truncation was used for the MDSNWY data.

Condition (2) in Section 5.6.1 has a less simple solution than that discussed above. In some instances the generated data was orders of magnitude greater than the maximum historical values. Two criteria were considered in the adoption of upper bounds to be placed on the data. Firstly, as these large values tended to occur in the wetter months, storages were likely to be relatively full and not all of the inflow could be stored, i.e. at least some would be passed downstream to the sea. Secondly, the study is concerned more with low flow sequences and their effect upon the system. Adoption of the maximum historical value corresponding to the month in which the large generation occurred, as an upper bound for the appropriate data set, was considered to be a satisfactory solution in light of the two points mentioned above.

5.7 Simplified Data Generation

Four sets of data were not used in the synthetic generation model as discussed in Section 5.2. To make full use of the River Murray Commission simulation model of the River it was necessary to provide the full 17 data sets mentioned in Chapter 4. A simplified generation procedure based on the historical data was used for the four unusual data sets. This was based on the following assumptions:

- Inflows from the Loddon are small and thus are not very significant.
- Evaporation, although significant does not vary greatly on an annual basis or for a particular month. In any case, losses are far more dependent upon storage.
- Spatial correlation between these four data sets and the remaining ones can be neglected.
- Monthly serial correlations should be preserved.
- Annual serial correlation, especially for Loddon inflows should be preserved.

To this end a simplified data generation process was developed. A uniform random number generator was developed which generated a number between 1 and 95. A correlation structure was further added such that each number generated was correlated to the previous one to the same extent as the annual correlation of the Loddon flows. For each number generated, this was used to select the corresponding year from the historical data. The full 12 months for that year was then used as the synthetic data record. This process was repeated until enough years of data were generated.

5.8 Synthetic Forecasting

The synthetic data generation process developed in this study can also be used to produce serially and spatially correlated forecasts of inflows correlated to previous history. Correlated forecasts for multisite data are an essential tool in the operation of a resource such as the River Murray. Of great importance is an estimate of the flows which are likely to be exceeded with a specified probability. These can be used to aid in management decisions under drought conditions.

The principle of synthetic forecasting is almost identical to that of the general synthetic data generation process. Data needs to be transformed and then generated. However, unlike the process described earlier in this Chapter the effect of the initial conditions in the generation process is important as this provides correlation to the recent history.

A FORTRAN program suite was written to perform synthetic forecasting. The forecasts can be generated from one to 24 months duration commencing in any month of the year. Only a very limited analysis of the output from this program suite was performed. *Visual* inspection of the forecast data and comparison with historical data for the same period, when a number of forecasts had been generated to provide a probability of exceedance type analysis, showed the method to have significant potential. However, no rigorous statistical testing has been performed and the process has not been validated.

Chapter 6

River Murray Storage/Behavior Analysis

One of the earliest methods used for storage/behavior analysis was that of the *mass diagram* developed by Rippl in 1883 (Loucks et. al., 1981) [21]. Using this method, cumulative inflows are plotted against time and compared to a constant draw. A further refinement to this procedure plots cumulative *net* inflow against time which allows more readily for variable draws to be accommodated. These methods are graphical and somewhat cumbersome. A numerical version of the mass diagram referred to as the *sequent peak* method (Loucks et. al. 1981) can be used in computer based analysis.

The disadvantage of the abovementioned methods is that they represent deterministic analysis. Gould's Probability Matrix method (Gould, 1961 [12]; McMahon & Mein, 1978 [24]) provides a probability based analysis.

However, this method is better suited to single reservoir systems with *relatively* simple operating procedures. This is not the case with the River Murray which comprises four major storages and highly complex operating procedures. A probability matrix type of analysis has been used but the inputs are those derived from simulation modelling.

6.1 River Murray Simulation

The River Murray Simulation model (MSM) originally written in 1965 by the River Murray Commission has been used to simulate the River Murray for this study. The model is regularly updated to incorporate changes in operating procedures as they occur.

The procedure used to investigate storage and behavior, allocations and restrictions, is discussed in this Chapter. The results and shortfalls are discussed in Chapter 7.

Two synthetic sequences each of 950 years of monthly data for the streamflow, rainfall and evaporation sites necessary as input to MSM were generated. Each of these data sets comprised ten sets of 95 years of monthly data, each one independent from the other. Using this approach a greater number of differing starting conditions for the system could be simulated. These two sets of data were run through MSM and the following monthly data obtàined as output:

1. total active storage
2. total New South Wales diversion
3. total Victorian diversion

4. New South Wales shortfall in supply
5. Victorian shortfall in supply
6. South Australian shortfall in supply

The shortfalls mentioned above represent for New South Wales and Victoria the difference between what was supplied (diverted) and what would have been diverted had *unlimited* resources been available. For South Australia it represents the volume of water below entitlement.

Two methods have been used to analyse this data. For both methods the following comments apply:

- The analysis is from July 31^{st} to May 31^{st} in the following or latter years. May 31^{st} being the date specified in the River Murray Waters Agreement in relation to the declaration of restrictions.
- Total active storage is the combination of active storage in Dartmouth and Hume reservoirs, Menindee Lakes and Lake Victoria.
- Actual supply to New South Wales and Victoria are given as items 2 and 3 above.
- Actual supply to South Australia is the South Australian entitlement flow less the shortfall given in item 6 above. Note that negative shortfalls (excesses) are truncated to zero. This however does not present a problem in the analysis.
- Required supply for New South Wales and Victoria are the respective diversions plus the shortfalls.
- For South Australia, the required supply is the entitlement flow.

6.2 Probability Analysis

The first type of analysis is depicted in Figure 6.1. The total system active storage at the end of July is shown in the left most column. The total active system storage at the end of May in the following, or subsequent years heads the remaining columns. The entries that are placed within the table represent the probability of finishing with the indicated storage or more, having commenced with a specific starting storage. This is based on the fraction of times each ending state occurs in the simulation given a particular starting state. These probabilities are tabulated for up to five years ahead in separate tables.

The second method of analysis is shown in Figure 6.2. The probability of achieving a specified fraction of required supply is determined. Note that this relates to the supply in the final year. This is tabulated for up to five years ahead for each of the three states involved, New South Wales, Victoria and South Australia.

Some of the input data used is from regulated streams, the regulation being a function of operating policy. Also, the model is governed by operating policy coded into MSM. For this reason the probability matrices generated only strictly apply under the allocation and restriction policies currently modelled within MSM. There are also some problems associated with the data which are discussed in Chapter 7. However, the data used and the results obtained can be used as a benchmark run for comparing the effect of changes in policies.

Total System Storage (July 31) Gl.	**Total System Storage (May 31) Gl.**					
	....	> 2500	> 3000	> 3500	> 4000	....
2501-3000	.	.	.	.	.	.
3001-3500	.	.	.	.	.	.
3501-4000	.	.	.	.	.	.
4001-4500	.	.	.	.	.	.

Figure 6.1: Summary Matrix for Analysis Type I.

Total System Storage (July 31) Gl.	**(Actual Supply)/(Required Supply) $\times$ 100%**					
	....	$> 70\%$	$> 75\%$	$> 80\%$	$> 85\%$	....
2501-3000	.	.	.	.	.	.
3001-3500	.	.	.	.	.	.
3501-4000	.	.	.	.	.	.
4001-4500	.	.	.	.	.	.

Figure 6.2: Summary Matrix for Analysis Type II.

Chapter 7

Results

There are three major areas where the results of this study need to be investigated. These are the quality of the synthetically generated data in comparison to the historical data using statistical properties; secondly, the same comparison but using system response instead of summary statistics. Finally, an investigation is carried out of the implications of system performance, with regard to system failure, assuming the generated data sets to be adequate, given selected initialization sequences.

7.1 Statistical Data Comparisons

Various methods have been employed to generate the data in order to compare the usefulness of these generation methods.

In particular, the following were used:

- Box-Cox transformation using lag 1 and lag 12 terms in the generation.
- Three parameter logarithmic transformation using lag 1 and lag 12 terms in the generation.
- Box-Cox transformation using only the lag 1 terms in the generation (i.e., $[M_2^t]$ and $[M_3^t]$ set equal to zero).

Various statistical tests have been used to compare the quality of the synthetically generated data using the different methods of generation, with the historical data sets.

7.1.1 Fully Developed Model

This section discusses the results obtained when the full Box-Cox transformation is used (equation 4.7) and the complete generation procedure (equation 5.1) operated. There is too much data to be presented here. Some typical results only will be shown. A complete tabulation of results can be found in Appendix H.

A total of 84 sets of 95 years of monthly data were generated. This provided a reasonable number of years of data to be tested (7980 in total). A maximum of 94 sets could have been produced using independent seeds from the historical data but this exceeded the accessible capacity of the computing facility available to the author.

Table 7.1 shows the mean and variance of the various statistics for inflows to the Murray from the Kiewa river. Comparison of this table with Table 7.2, also for Kiewa inflows shows good agreement with the lower level statistics especially. In the tables the following abreviations are used: Mean = mean; St.Dev = standard deviation; Cs. = coefficient of skewness; Ck. = coefficient of kurtosis; SC1 = lag 1 serial correlation.

The statistical tests for the data can be done in one of two ways:

- hypothesise that the historical series is not significantly different from the 84 generated replicates. This implies that the null hypothesis is that the historical series comes from the generated set. In this case, test for the significance of each of the statistics of the historical series in relation to the distribution of that statistic in ths synthetic series. In this case the following test is used:

  $$\frac{|\overline{U} - U|}{S} \leq Z_{\alpha/2}$$

  where:

  $\overline{U}$ is the mean of the statistic for the 84 sets of data.

  U is the statistic from the historical data.

  S is the standard deviation of the statistic for the set of synthetic series.

  $Z_{\alpha/2}$ is the Z-statistic at significance level $\alpha/2$.

- evaluate the standard errors in the estimates of the statistics for the historical series and test whether the mean statistic of the generated series is significantly different from the historical value. In this case, hypothesise that the historical series came from a population with true statistics equal to the mean values for the set of synthetic series. In this case use the test:

$$\frac{|\overline{U} - U|}{\sigma/\sqrt{n}} \leq Z_{\alpha/2}$$

where:

σ is the standard deviation of the historical data.

n is the number of years of historical data.

Evaluation of these two statistics gave very similar results. This was the case for a number of trials. Although not exhaustive, this indicated that either of the tests would be satisfactory. The second test discussed above was used. Table 7.3 use this test at the 5% significance level on the synthetic data generated in full mode (Box-Cox transform and lag 1 and lag 12 terms in the generation). Appendix L gives a complete set of tables.

Note that the Z-statistic has been used. This is equivalent to using the t-test with ∞ degrees of freedom. This creates a more difficult test to pass but reflects the situation that the statistics have in reality been derived from a much larger data set and as the assumptions of normality are not satisfied a stricter test seems more readilly justified.

7.1.2 3-Parameter Log Transformation

Table 7.4 compares the statistics for the Box-Cox transformed synthetic data with the 3-parameter log transformed data where both data sets were generated with the lag 12 term included. As can be seen, there is little difference between the two data sets although the Box-Cox transformed data gives statistics closer to the historical values for the lower order moments.

The method used to generate the data is as for the fully developed model. Equation 5.1 is used. Note that as for the fully developed case, significance tests on the correlation matrices are performed prior to generation. In the FORTRAN program which was written to calculate the correlation matrices provision was made to test significance at 5%, 10% or assume all correlations to be significant. For all generations used in this study, the 5% significance test level was used. This was input interactively. When a value in the $[M]$ matrices was found to be insignificant, it was set to zero so it would have no further effect.

7.1.3 Importance of Lag 12 Terms

The major reason for incorporation of lag 12 and associated terms in the model was to preserve annual correlations where they were significant. Table 7.5 shows the general monthly and annual statistics for inflows to the River Murray from the Kiewa, generated without use of the lag 12 and associated terms. As can be seen, there is little difference between these and the statistics generated when using the lag 12 terms. Of greater interest are the correlation coefficients shown in Table 7.6. This data represents the annual lag 0 and lag 1 correlation coefficients created by the two different modes of generation compared with the historical data. Kiewa inflows have been used to demonstrate this data as these have been used throughout the statistical discussions. These data do not show any marked difference between the two sets of results. Here again, question is placed on the value of the lag 12 term. The tables in Appendix G show all the correlations.

SUMMARY STATISTICS FOR MDKIEW DATA
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	18.9071	13.5298	1.3322	5.3124	0.6574
	variance	2.1845	2.4481	0.1582	3.0674	0.0043
February	mean	12.7702	9.8060	1.6201	6.4431	0.6260
	variance	1.6599	2.3092	0.1980	5.0918	0.0062
March	mean	14.5738	12.3405	1.3115	4.9653	0.4198
	variance	1.6605	2.0477	0.1181	1.7802	0.0099
April	mean	20.2333	21.0571	3.4532	20.2452	0.5800
	variance	5.0153	43.6769	2.1656	172.1372	0.0127
May	mean	34.1786	30.0583	2.8086	13.8303	0.3974
	variance	8.9518	38.1593	0.6872	36.2913	0.0233
June	mean	52.8976	40.7833	1.9884	7.5996	0.6535
	variance	17.4771	35.1441	0.1242	5.0758	0.0085
July	mean	70.2810	47.4179	1.5447	5.7764	0.6792
	variance	24.4702	27.8991	0.1490	3.0874	0.0061
August	mean	81.8738	49.1429	0.7605	3.3133	0.6866
	variance	20.0586	13.6569	0.0438	0.2952	0.0051
September	mean	101.5167	49.2560	0.8402	3.5198	0.7012
	variance	42.6645	21.9225	0.0667	0.6730	0.0038
October	mean	104.3107	54.8429	1.2437	5.2107	0.7199
	variance	37.3634	34.8446	0.1484	2.7654	0.0045
November	mean	63.2357	34.1031	0.5426	2.6827	0.7784
	variance	14.7939	4.4185	0.0232	0.1123	0.0033
December	mean	31.5762	19.2095	0.8153	3.3389	0.7550
	variance	4.6406	2.0071	0.0402	0.3806	0.0039
Annual	mean	606.3580	254.6276	0.8828	3.9484	0.1587
	variance	884.5665	541.2693	0.1184	1.7594	0.0094

Table 7.1: Summary statistics for generated Kiewa inflows.

7.2 Model Testing

Testing of the synthetic data compared with the historic data in an operational sense was undertaken by the River Murray Commission. These tests have been performed using the Commission's simulation model of the River Murray, MSM.

Two sets each of 950 years of monthly data, generated using the fully developed model were run through the simulation model, the results of which may be seen in Table 7.7. In this table, run 377 refers to the *benchmark* run of the River Murray Commission using the historical data. Runs 450 and 451 are the two runs using the synthetically generated data. As can be seen from this table, both the synthetic data sets produce fewer restrictions than the *benchmark* data set.

A probable cause of this discrepancy are the errors associated with generation of the Darling and Murrumbidgee flows. Both the historical records are highly modified and the generation procedure is not entirely satisfactory. It was realized that this type of problem would occur with these data sets and the generation procedure adopted was accepted knowing these problems would arise.

Although these modified flows may not have reproduced well in the generation process, the remaining data can be considered to have been generated very adequately. This adequacy is further demonstrated by the probability of exceedance plots shown for natural inflow to Hume reservoir in Figure 7.1.

Note that in Figure 7.1, flows with duration 12 months or less are calculated using strictly overlapping sums, one month to the next. Flows with

Statistics for Historical Kiewa River Data					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	18.9	14.0	1.5970	6.4190	0.5976
February	12.8	10.7	1.9160	7.3550	0.6272
March	14.6	13.0	1.8020	6.2530	0.4982
April	20.7	26.2	6.1300	48.6340	0.4312
May	34.3	34.0	3.9560	21.7780	0.6746
June	52.0	41.5	2.3850	9.4430	0.6317
July	69.4	47.2	1.7480	6.5390	0.6969
August	82.1	50.9	1.1190	3.8880	0.7086
September	100.2	48.8	0.9770	4.1090	0.7001
October	104.4	57.1	1.4370	6.1550	0.7753
November	63.7	36.2	0.6340	2.6030	0.7681
December	31.5	19.5	0.9490	3.5010	0.7405
Annual	604.55	291.66	1.4475	6.2490	0.2074

Table 7.2: Statistics for the historical data.

STATISTICAL TESTING AGAINST HISTORICAL DATA Inflow from Kiewa River.													
Passed ⇒ Passed the test. Failed ⇒ Failed the test.													
Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed 0.005	Passed -0.027	Passed -0.020	Passed -0.174	Passed -0.035	Passed 0.211	Passed 0.182	Passed -0.043	Passed -0.263	Passed -0.015	Passed -0.125	Passed 0.038	Passed 0.061
Sdev.	Passed -0.463	Passed -1.152	Passed -0.699	Failed -2.706	Passed -1.598	Passed -0.238	Passed 0.064	Passed -0.476	Passed 0.129	Passed -0.545	Passed -0.833	Passed -0.205	Passed -1.750
Cs.	Passed -0.463	Passed -1.152	Failed -1.986	Failed < -9.9	Failed -4.645	Passed -1.606	Passed -0.823	Passed -1.451	Passed -0.554	Passed -0.783	Passed -0.370	Passed -0.541	Failed -2.286
Ck.	Failed -2.200	Passed -1.813	Failed -2.560	Failed < -9.9	Failed < -9.9	Failed -3.665	Passed -1.516	Passed -1.143	Passed -1.171	Passed -1.877	Passed 0.158	Passed -0.322	Failed -4.574
SC1	Passed 0.581	Passed -0.012	Passed -0.761	Passed 1.445	Failed -2.691	Passed 0.212	Passed -0.172	Passed -0.214	Passed 0.011	Passed -0.538	Passed 0.100	Passed 0.141	Passed -0.861

Table 7.3: 5% significance testing for Kiewa flows.

STATISTICS FOR GENERATED KIEWA RIVER DATA
definition of terms as for Table 7.1

		Mean	St.Dev.	Cs.	Ck.	SC1
Jan	3-par Log	18.6774	13.4131	1.3514	5.3821	0.6525
	Box-Cox	18.9071	13.5298	1.3322	5.3124	0.6574
Feb	3-par Log	12.4048	9.6440	1.6608	6.6426	0.6231
	Box-Cox	12.7702	9.8060	1.6201	6.4431	0.6260
Mar	3-par Log	14.4357	12.2905	1.5216	5.6179	0.4405
	Box-Cox	14.5738	12.3405	1.3115	4.9653	0.4198
Apr	3-par Log	19.2869	16.7893	2.0792	9.0355	0.6018
	Box-Cox	20.2333	21.0571	3.4532	20.2452	0.5800
May	3-par Log	33.7750	27.3440	2.0092	8.3786	0.4380
	Box-Cox	34.1786	30.0583	2.8086	13.8303	0.3974
Jun	3-par Log	50.9274	38.2476	1.9542	7.5594	0.6384
	Box-Cox	52.8976	40.7833	1.9884	7.5996	0.6535
Jul	3-par Log	69.6214	47.6583	1.5473	5.7015	0.6793
	Box-Cox	70.2810	47.4179	1.5447	5.7764	0.6792
Aug	3-par Log	81.2738	49.2143	0.8351	3.4439	0.7076
	Box-Cox	81.8738	49.1492	0.7605	3.3133	0.6866
Sep	3-par Log	99.4274	48.7202	0.9797	4.0645	0.7125
	Box-Cox	101.5167	49.2560	0.8402	3.5198	0.7012
Oct	3-par Log	102.9607	54.0452	1.1282	4.6505	0.7257
	Box-Cox	104.3107	54.8429	1.2437	5.2107	0.7199
Nov	3-par Log	62.4714	33.8536	0.6089	2.9083	0.7797
	Box-Cox	63.2357	34.1031	0.5426	2.6827	0.7784
Dec	3-par Log	31.0690	18.9107	0.9243	3.6267	0.7486
	Box-Cox	31.5762	19.2095	0.8153	3.3389	0.7550
Ann	3-par Log	596.3196	248.4315	0.8529	3.6520	0.1651
	Box-Cox	606.3580	254.6276	0.8828	3.9484	0.1587

Table 7.4: Statistical comparisons of transformation methods.

SUMMARY STATISTICS FOR MDKIEW DATA data generated using only the lag 1 terms						
		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	18.9262	13.5083	1.3440	5.3282	0.6570
	variance	2.1788	2.4593	0.1589	3.1143	0.0044
February	mean	12.7726	9.8012	1.6261	6.4526	0.6255
	variance	1.6495	2.3160	0.1962	5.0938	0.0063
March	mean	14.6536	12.2321	1.3601	5.0358	0.4189
	variance	1.6379	2.0834	0.1137	1.8498	0.0100
April	mean	20.2369	21.0536	3.4551	20.2541	0.5801
	variance	5.0277	43.7110	2.1641	172.1863	0.0129
May	mean	34.1810	30.0536	2.8091	13.8329	0.3973
	variance	8.9601	38.1071	0.6875	36.3044	0.0233
June	mean	52.8976	40.7833	1.9884	7.5996	0.6534
	variance	17.4771	35.1441	0.1242	5.0758	0.0085
July	mean	70.2810	47.4179	1.5447	5.7764	0.6792
	variance	24.4702	27.8991	0.1490	3.0874	0.0061
August	mean	81.9298	49.0429	0.7721	3.3119	0.6869
	variance	19.8556	13.7275	0.0428	0.2999	0.0051
September	mean	101.5167	49.2560	0.8402	3.5198	0.7011
	variance	42.6645	21.9225	0.0667	0.6730	0.0038
October	mean	104.3107	54.8417	1.2440	5.2110	0.7199
	variance	37.3634	34.8540	0.1485	2.7660	0.0045
November	mean	63.2357	34.0131	0.5426	2.6827	0.7784
	variance	14.7939	4.4185	0.0232	0.1123	0.0033
December	mean	31.5786	19.2060	0.8161	3.3391	0.7550
	variance	4.6465	2.0039	0.0403	0.3809	0.0039
Annual	mean	606.5264	254.4906	0.8849	3.9506	0.1587
	variance	882.3686	541.5330	0.1186	1.7665	0.0095

Table 7.5: Summary statistics for generated Kiewa inflows.

	MDSNWY	MDMRGT	MDDART	MDHUME	MDKIEW	HUNREG	OVENMD	MURRUM	INFMEN	MDBCGR	MDRNDN	MDRNKR	MDRNTC
ANNUAL LAG 0 CORRELATION COEFFICIENTS													
(generation using no lag 12 terms)													
Hist	-0.420	0.921	0.916	0.944	1.000	0.940	0.933	0.681	0.455	0.887	0.772	0.743	0.761
Syn.	-0.503	0.901	0.912	0.935	1.000	0.930	0.924	0.525	0.387	0.795	0.704	0.699	0.694
(generation using lag 12 terms)													
Hist	-0.420	0.921	0.916	0.944	1.000	0.940	0.933	0.681	0.455	0.887	0.772	0.743	0.761
Syn.	-0.425	0.899	0.913	0.934	1.000	0.928	0.918	0.505	0.384	0.783	0.689	0.681	0.691
ANNUAL LAG 1 CORRELATION COEFFICIENTS													
(generation using no lag 12 terms)													
Hist	-0.085	0.117	0.124	0.130	0.207	0.129	0.185	0.074	0.086	0.151	0.195	0.198	0.248
Syn.	-0.062	0.072	0.075	0.073	0.067	0.072	0.063	0.038	0.043	0.049	0.069	0.075	0.063
(generation using lag 12 terms)													
Hist	-0.085	0.117	0.124	0.130	0.207	0.129	0.185	0.074	0.086	0.151	0.195	0.198	0.248
Syn.	-0.018	0.034	0.046	0.052	0.095	0.051	0.037	0.071	0.180	0.072	0.072	0.112	0.082

Table 7.6: Annual correlation coefficients for Kiewa inflows.

HISTORICAL AND SYNTHETIC MODEL RESULTS		Run 377	Run 450	Run 451
Average Diversion	NSW	1662.5	1703.4	1738.1
(Gl/year)	VIC	1874.9	1888.1	1890.6
Average Darling Diversion (Gl/year)		79.1	80.3	80.0
Average Shortfall	NSW	241.8	196.6	155.6
(Gl/year)	VIC	60.6	40.6	35.1
	S.A.	13.2	4.7	6.1
Peak Annual Shortfall	NSW	1337.0	1906.0	1794.0
(Gl/year)	VIC	862.0	1887.0	1641.0
	S.A.	416.0	476.0	614.0
Years With Shortfalls	NSW	63.8	63.1	57.8
(as a % of total)	VIC	31.9	27.3	21.6
	S.A.	19.1	11.4	8.4
% of years NSW allocation < 40%		2.1	1.1	1.1
% of years VIC allocation < 100%		4.3	1.5	1.7
% of years S.A. supply < 90%		3.2	0.8	1.3

Table 7.7: Comparison of Model Results. (courtesy River Murray Commission).

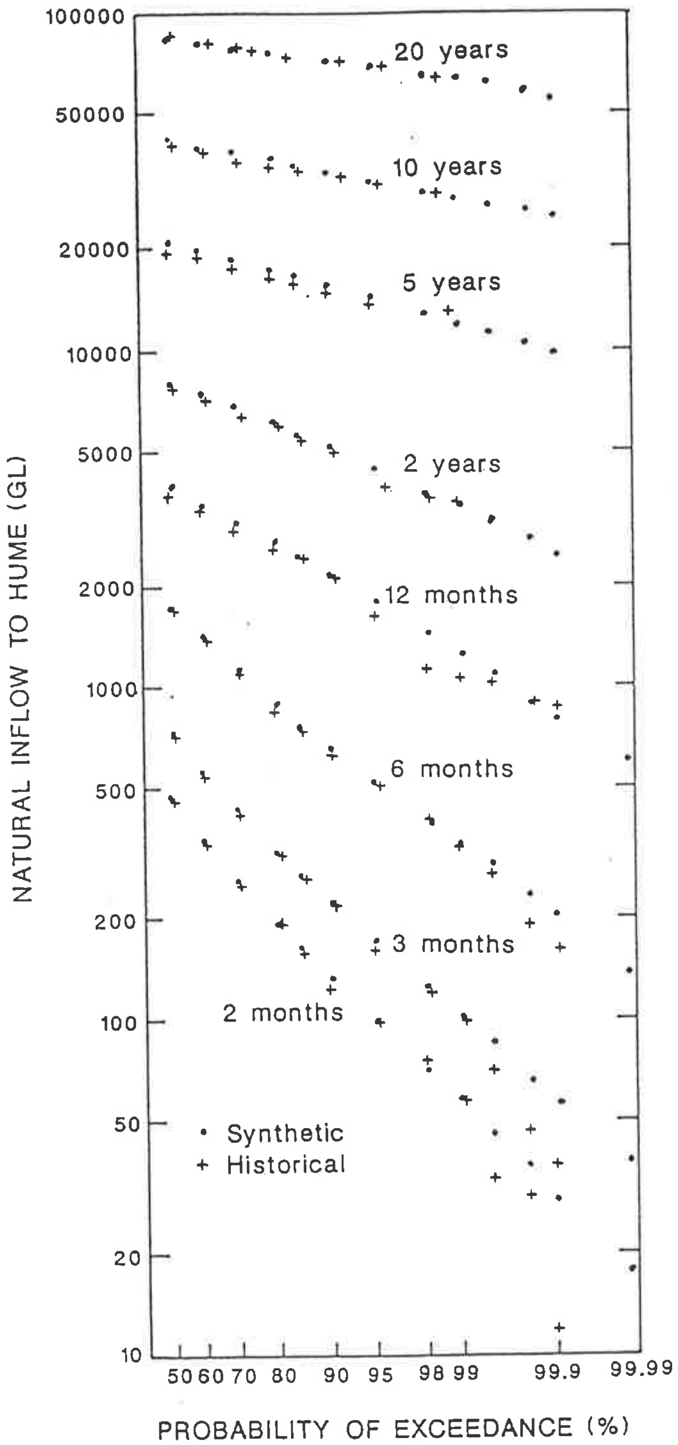


Figure 7.1: Low flow probability curves for natural Hume inflow.

duration more than 12 months are calculated with an overlap on a 12 month basis. This has been done to provide a reasonable number of data points from the historical data. The same method has been used to analyse the synthetic data. As overlapping sums are used, the probability of exceedance plot should not be used to estimate recurrence intervals. It can be seen from this figure that the exceedance values for the synthetic series matches that for the historical series, even for series of up to 20 years duration although this is due in part to the reduced correlation over this period.

7.3 System Failure Probability

The method of analysis for system failure probability has been outlined in Chapter 6. The analysis has been conducted for the full 1900 years of output from MSM and for expedience it has been assumed that the input data comprises an adequately representative series.

Two analyses have been performed in an attempt to evaluate the consequences of allowing forecast total active system storage to fall below the current restriction level of 2500 Gl. Method I evaluates the probability of achieving a given system storage at the 31^{st} of May in the following, or latter years given an initial total active system storage at the 31^{st} of July in the starting year. This analysis looks at up to five years ahead. Method II investigates the ratio of actual supply to required supply in the period from July 31^{st} to May 31^{st} in the following and later years. The probability of achieving various percentages of actual to required supply are tabulated given various starting total active system storages at July 31^{st}.

With this type of analysis even 1900 years of data is to few to achieve a smooth distribution. The failure probability tables are shown in Appendix K. As can be seen, large probability steps sometimes occur due to a shortage of data points for calculating those probabilities.

Chapter 8

Summary and Conclusions

The aim of this research was to investigate the equity and associated risks to all States using River Murray water when a forecast storage volume of 2 500 Gl at the 31^{st} of May is used to trigger a period of declared restriction. To this end, the technique of synthetic hydrology was used to generate a long record of streamflow, rainfall and evaporation data. The purpose of this was to provide a better distribution of "extreme" events to be used in simulation modelling. Various transformation and generation methods have been used and their performance evaluated.

The use of the generalized Box-Cox transformation (see equation 4.7) provided a transformation method which appeared to be only slightly better than application of the simpler shifted logarithmic transform. In the final outcome, for the generation of synthetic data sets, it appears for this case study at any rate that there is very little difference in the final analysis when either of the transformation methods are used. It is therefore advisable to use the shifted logarithmic transform initially unless this is found to be unsuitable.

One novel approach taken in this research was to use a monthly synthetic generation model with lag 1 and lag 12 correlation relationships incorporated within it. The reason this was adopted was to attempt to carry through the model not only the monthly, but also some of the annual correlation structure thus providing a more statistically and operationally correct synthetic data sequence. The use of these extra terms has produced only a slightly better model when compared to a strictly lag 1 analysis but the difficulty with lack of parsimony, and the excessive computing time required removes much of its attraction.

It should therefore be concluded that future research or indeed any future investigation into River Murray operations using synthetic hydrological procedures should initially use the simple shifted logarithmic transformation and a lag 1 autoregressive data generation model.

The data used in the simulation of the River Murray performed by the River Murray Commission was generated using the fully developed model as the effort had at this stage been applied and this model did produce marginally better results. Some difficulties arose, as discussed elsewhere, but it would seem apparent that the use of the 2 500 Gl forecast reserve figure for River Murray operations as currently used is a reasonable value.

The probability of occurrence charts as shown in Appendix K are usefull as a planning tool. It should be remembered, however, that the data used to generate these tables embodies the current operational procedures for the Murray and Darling basin and variations will create changes in the associated probabilities.

Further work in the simulation modelling and the interpretation of the results obtained from these tables needs to be conducted. With the continued increasing use by each of the States of river water it is becoming important that a final answer to the reserve strategy which is equitable to all states be found.

8.1 Future Research

With particular reference to the data sets used in this study, a simpler approach to the time series modelling should be adopted. Indeed, in the area of data transformation it is recommended that a simple transform with no shift term be used. Then if this proves to be unsuccessfull, try the more complex transformations. The same can be said for the methods of generation. In this study there is little difference in the final results if the simple or complex generation methods are used. Once again, start with a simple generation method and sellect the more complex only if needed.

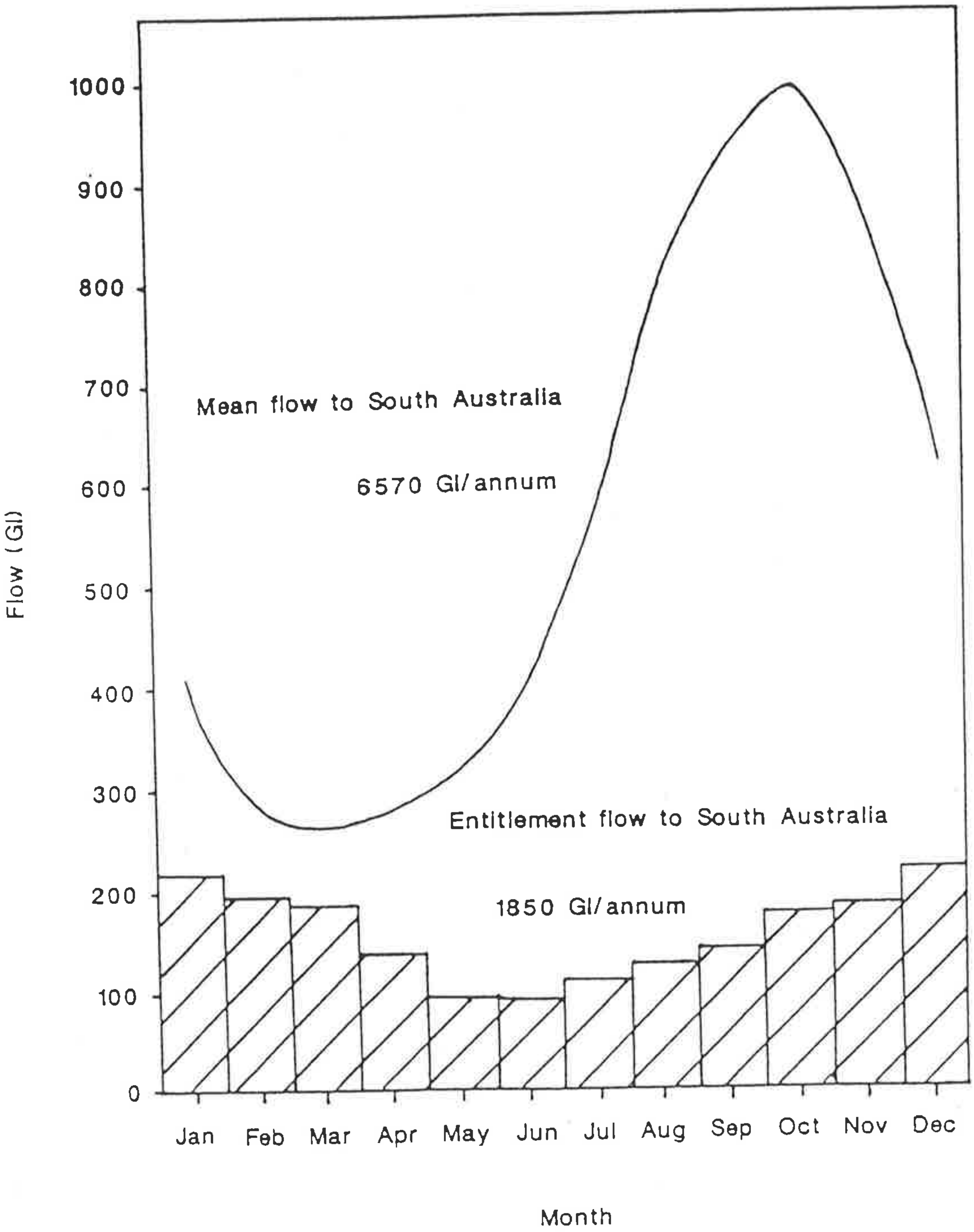
Simulation modelling was used to evaluate the failure probabilities for the River Murray. This is limited as it only evaluates the probabilities using one operating rule. A further area for future River Murray research, in particular investigating failure would be to develop an optimization procedure for decission making in the simulation model.

As mentioned at the start of this thesis, water quality has not been considered in this study. This is becomming more important as the resource is becomming more heavilly committed. More accurate water quality modelling, and forecasting needs to be developed to better manage the resource as a whole.

Appendix A

Entitlement Flow to South Australia

Entitlement flow is that flow which must be supplied to South Australia from the allocations of the two upper states given that a period of formal restriction is not in force. On the average, however, flow to South Australia is greater than entitlement flow, as shown in the graph overleaf.



Entitlement Flow to South Australia.

Appendix B

Derivations

For the Box-Cox transformation as used in this study, (equation 4.7) as $\lambda_{ij} \to 0$ the power transformation becomes the log transform.

We need to show that for:

$$f = \frac{(y+\tau)^\lambda - 1}{\lambda}$$

then:

$$\lim_{\lambda \to 0} f = \log_e(y+\tau)$$

$$\textit{let } z = (y+\tau)^\lambda$$

$$\Rightarrow \log_e z = \lambda \log_e(y+\tau)$$

$$\Rightarrow z = e^{\lambda \log_e(y+\tau)}$$

hence, f can be written as;

$$f = \frac{e^{\lambda \log_e(y+\tau)} - 1}{\lambda}$$

but:

$$e^x = 1 + x + x^2/2! + x^3/3! + \cdots$$

which for small x can be approximated as;

$$e^x \simeq 1 + x$$

so for small x,

$$e^{\lambda \log_e(y+\tau)} \simeq 1 + \lambda \log_e(y + \tau)$$

hence:

$$\lim_{\lambda \to 0} \frac{(y+\tau)^\lambda - 1}{\lambda} = \lim_{\lambda \to 0} \frac{1 + \lambda \log_e(y+\tau) - 1}{\lambda}$$

therefore, as the plus and minus 1 negate each other, and the λ's cancel out, when

$$\lambda = 0, \quad f = \log_e(y + \tau)$$

and the equations of 4.7 are continuous.

The following gives the derivation of the $[A_t]$, $[B_t]$, and $[C_t]$ matrices used in the data generation equation 5.1.

The generation equation is:

$$[Y_t^q] = [A_t][Y_{t-1}^q] + [B_t][Y_t^{q-1}] + [C_t][\varepsilon_t^q] \tag{B.1}$$

Post-multiplying equation B.1 by $[Y_{t-1}^q]^T$ yields

$$[Y_t^q][Y_{t-1}^q]^T = [A_t][Y_{t-1}^q][Y_{t-1}^q]^T + [B_t][Y_t^{q-1}][Y_{t-1}^q]^T + [C_t][\varepsilon_t^q][Y_{t-1}^q]^T$$

Taking expectations yields

$$\mathcal{E}\left[[Y_t^q][Y_{t-1}^q]^T\right] = [A_t]\mathcal{E}\left[[Y_{t-1}^q][Y_{t-1}^q]^T\right] + [B_t]\mathcal{E}\left[[Y_t^{q-1}][Y_{t-1}^q]^T\right] + [C_t]\mathcal{E}\left[[\varepsilon_t^q][Y_{t-1}^q]^T\right]$$

where $\mathcal{E}[\cdot]$ denotes the expected value operator.
however, as $\mathcal{E}[\varepsilon_t^q] = 0$ and as $[\varepsilon_t^q]$ and $[Y_{t-1}^q]$ are independent,

$$\Rightarrow \mathcal{E}\left[[\varepsilon_t^q][Y_{t-1}^q]^T\right] = 0$$

If we then let

$$\mathcal{E}\left[[Y_t^q][Y_{t-1}^q]^T\right] = [M_1^t]$$
$$\mathcal{E}\left[[Y_{t-1}^q][Y_{t-1}^q]^T\right] = [M_0^t]$$
$$\mathcal{E}\left[[Y_t^{q-1}][Y_{t-1}^q]^T\right] = [M_2^t]$$

the following simplification can be made

$$[M_1^t] = [A_t][M_0^t] + [B_t][M_2^t] \tag{B.2}$$

Post-multiplying equation B.1 by $[Y_t^{q-1}]^T$ and taking expectations yields

$$\mathcal{E}\left[[Y_t^q][Y_t^{q-1}]^T\right] = [A_t]\mathcal{E}\left[[Y_{t-1}^q][Y_t^{q-1}]^T\right] + [B_t]\mathcal{E}\left[[Y_t^{q-1}][Y_t^{q-1}]^T\right] + [C_t]\mathcal{E}\left[[\varepsilon_t^q][Y_t^{q-1}]^T\right]$$

If we then let

$$\mathcal{E}\left[[Y_t^q][Y_t^{q-1}]^T\right] = [M_3^t]$$

$$\mathcal{E}\left[[Y_{t-1}^q][Y_t^{q-1}]^T\right] = \mathcal{E}\left[\left[[Y_t^{q-1}][Y_{t-1}^q]^T\right]^T\right] = [M_2^t]^T$$

$$\mathcal{E}\left[[Y_t^{q-1}][Y_t^{q-1}]^T\right] = \mathcal{E}\left[[Y_t^q][Y_t^q]^T\right] = [M_4^t]$$

the following simplification can be made noting that $\mathcal{E}\left[[\varepsilon_t^q][Y_t^{q-1}]^T\right] = 0$

$$[M_3^t] = [A_t][M_2^t]^T + [B_t][M_4^t] \tag{B.3}$$

Post-multiplying equation B.1 by $[Y_t^q]^T$ and taking expectations yields

$$\mathcal{E}\left[[Y_t^q][Y_t^q]^T\right] = [A_t]\mathcal{E}\left[[Y_{t-1}^q][Y_t^q]^T\right] + [B_t]\mathcal{E}\left[[Y_t^{q-1}][Y_t^q]^T\right] + [C_t]\mathcal{E}\left[[\varepsilon_t^q][Y_t^q]^T\right]$$

If we then let

$$\mathcal{E}\left[[Y_t^q][Y_t^q]^T\right] = [M_4^t]$$

$$\mathcal{E}\left[[Y_{t-1}^q][Y_t^q]^T\right] = \mathcal{E}\left[\left[[Y_t^q][Y_{t-1}^q]^T\right]^T\right] = [M_1^t]^T$$

$$\mathcal{E}\left[[Y_t^{q-1}][Y_t^q]^T\right] = \mathcal{E}\left[\left[[Y_t^q][Y_t^{q-1}]^T\right]^T\right] = [M_3^t]^T$$

Now, from equation B.1

$$[Y_t^q] = [A_t][Y_{t-1}^q] + [B_t][Y_t^{q-1}] + [C_t][\varepsilon_t^q]$$

$$\Rightarrow [C_t]\mathcal{E}\left[[\varepsilon_t^q][Y_t^q]^T\right] = [C_t]\mathcal{E}\left[[\varepsilon_t^q]\left[[A_t][Y_{t-1}^q] + [B_t][Y_t^{q-1}] + [C_t][\varepsilon_t^q]\right]^T\right]$$

but

$$\left[[A_t][Y_{t-1}^q] + [B_t][Y_t^{q-1}] + [C_t][\varepsilon_t^q]\right]^T = [Y_{t-1}^q]^T[A_t]^T + [Y_t^{q-1}]^T[B_t]^T + [\varepsilon_t^q]^T[C_t]^T$$

thus implying;

$$[C_t]\mathcal{E}\left[[\varepsilon_t^q][Y_t^q]^T\right] =$$

$$[C_t]\mathcal{E}\left[[\varepsilon_t^q][Y_{t-1}^q]^T[A_t]^T + [\varepsilon_t^q][Y_t^{q-1}]^T[B_t]^T + [\varepsilon_t^q][\varepsilon_t^q]^T[C_t]^T\right]$$

$$= [C_t]\mathcal{E}\left[[\varepsilon_t^q][\varepsilon_t^q]^T\right][C_t]^T$$

however, as $\mathcal{E}\left[[\varepsilon_t^q][\varepsilon_t^q]^T\right] = 1$
the following simplification can be made

$$[M_4^t] = [A_t][M_1^t]^T + [B_t][M_3^t]^T + [C_t][C_t]^T \tag{B.4}$$

From equation B.2

$$[A_t] = \left[[M_1^t] - [B_t][M_2^t]\right][M_0^t]^{-1} \tag{B.5}$$

Using equations B.5 and B.3

$$\begin{aligned}
[M_3^t] &= \left[[M_1^t] - [B_t][M_2^t]\right][M_0^t]^{-1}[M_2^t]^T + [B_t][M_4^t] \\
&= [M_1^t][M_0^t]^{-1}[M_2^t]^T - [B_t][M_2^t][M_0^t]^{-1}[M_2^t]^T + [B_t][M_4^t] \\
\Rightarrow [B_t]\left[[M_4^t] - [M_2^t][M_0^t]^{-1}[M_2^t]^T\right] &= [M_3^t] - [M_1^t][M_0^t]^{-1}[M_2^t]^T \\
\Rightarrow [B_t] &= \left[[M_3^t] - [M_1^t][M_0^t]^{-1}[M_2^t]^T\right]\left[[M_4^t] - [M_2^t][M_0^t]^{-1}[M_2^t]^T\right]^{-1}
\end{aligned}$$

let,

$$\begin{aligned}
[G_t] &= [M_3^t] - [M_1^t][M_0^t]^{-1}[M_2^t]^T \\
[H_t] &= \left[[M_4^t] - [M_2^t][M_0^t]^{-1}[M_2^t]^T\right]^{-1}
\end{aligned}$$

then

$$[B_t] = [G_t][H_t] \tag{B.6}$$

and

$$[A_t] = \left[[M_1^t] - [G_t][H_t][M_2^t]\right][M_0^t]^{-1} \tag{B.7}$$

now, using equations B.4, B.6 and B.7:

$$[M_4^t] = \left[[M_1^t] - [G_t][H_t][M_2^t]\right][M_0^t]^{-1}[M_1^t]^T + [G_t][H_t][M_3^t] + [C_t][C_t]^T$$

which yields,

$$[C_t][C_t]^T = [M_4^t] - \left[[M_1^t] - [G_t][H_t][M_2^t]\right][M_0^t]^{-1}[M_1^t]^T - [G_t][H_t][M_3^t]^T \tag{B.8}$$

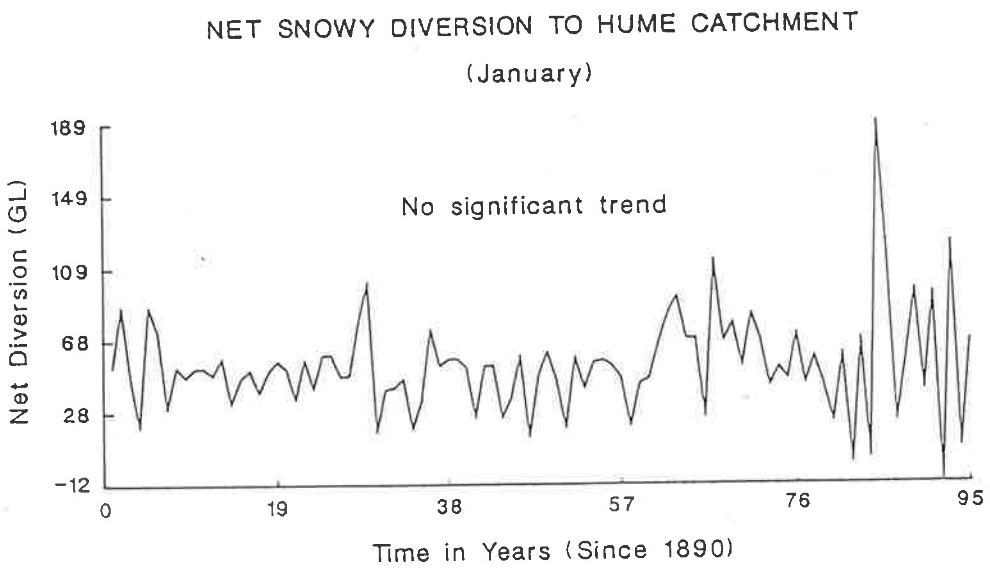
The entries in the $[M_0^t]$, $[M_1^t]$, $[M_2^t]$, $[M_3^t]$, $[M_4^t]$ are as defined in the following table.

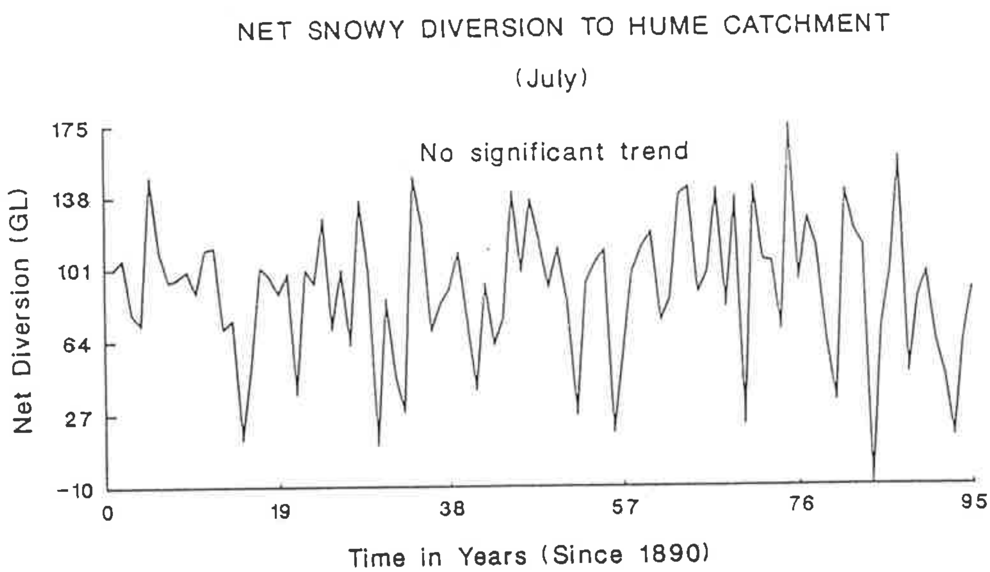
Matrix	Estimated Statistic	Lead Diagonal	Off Diagonal
$[M_0^t]$	$\frac{1}{n-1}\sum_{q=1}^{n} x_{t-1}^{q^i} x_{t-1}^{q^j}$	1.0	lag 0 cross correlations for the previous month
$[M_1^t]$	$\frac{1}{n-1}\sum_{q=1}^{n} x_t^{q^i} x_{t-1}^{q^j}$	lag 1 serial correlations	lag 1 cross correlations
$[M_2^t]$	$\frac{1}{n-2}\sum_{q=2}^{n} x_t^{(q-1)^i} x_{t-1}^{q^j}$	lead 11 serial correlations for the previous year	lead 11 cross correlations for the previous year
$[M_3^t]$	$\frac{1}{n-2}\sum_{q=2}^{n} x_t^{q^i} x_t^{(q-1)^j}$	lag 12 serial correlations	lag 12 cross correlations
$[M_4^t]$	$\frac{1}{n-1}\sum_{q=1}^{n} x_t^{q^i} x_t^{q^j}$	1.0	lag 0 cross correlations

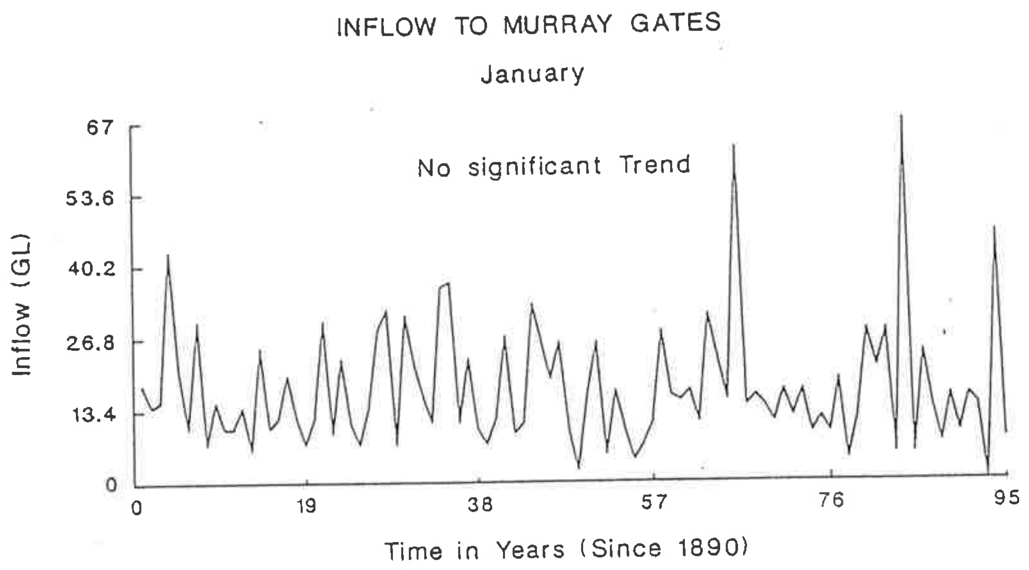
Appendix C

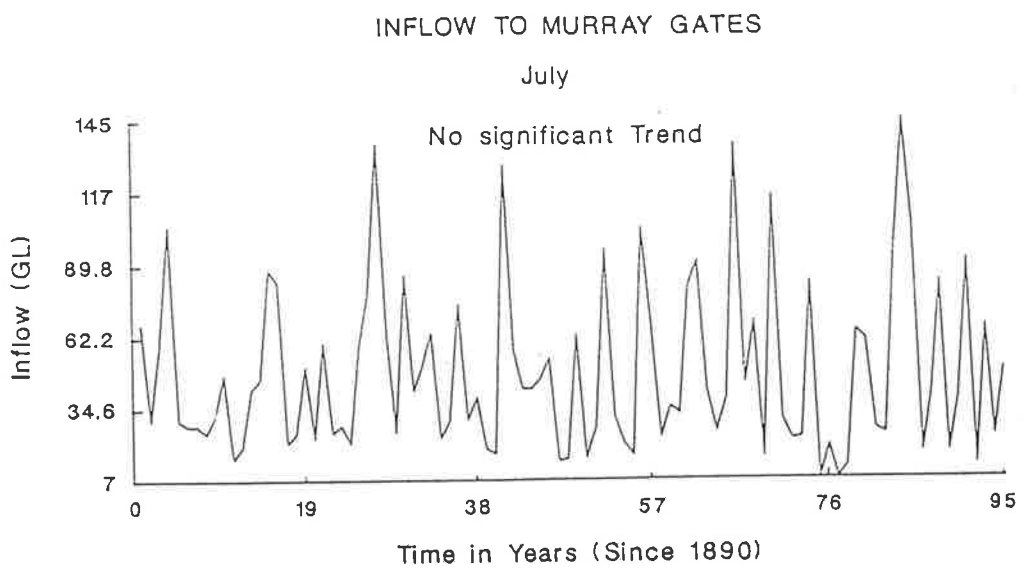
Time Series Plots

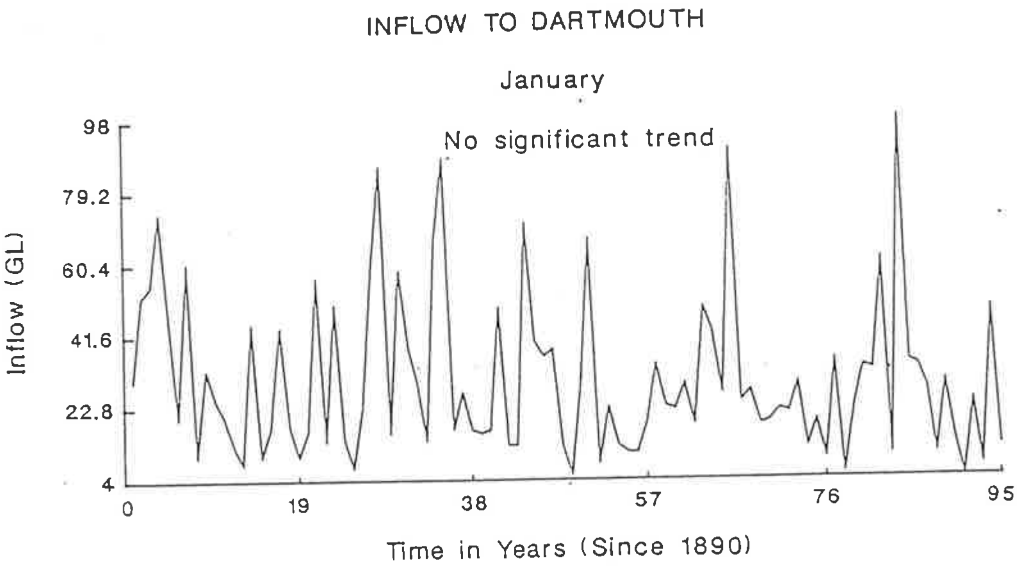
The plots shown in this Appendix are only intended to be representative. A full set has not been included as this was considered unnecessary and cumbersome. Plots of January and July data for each of the historical data sets (17 in all) only have been included.

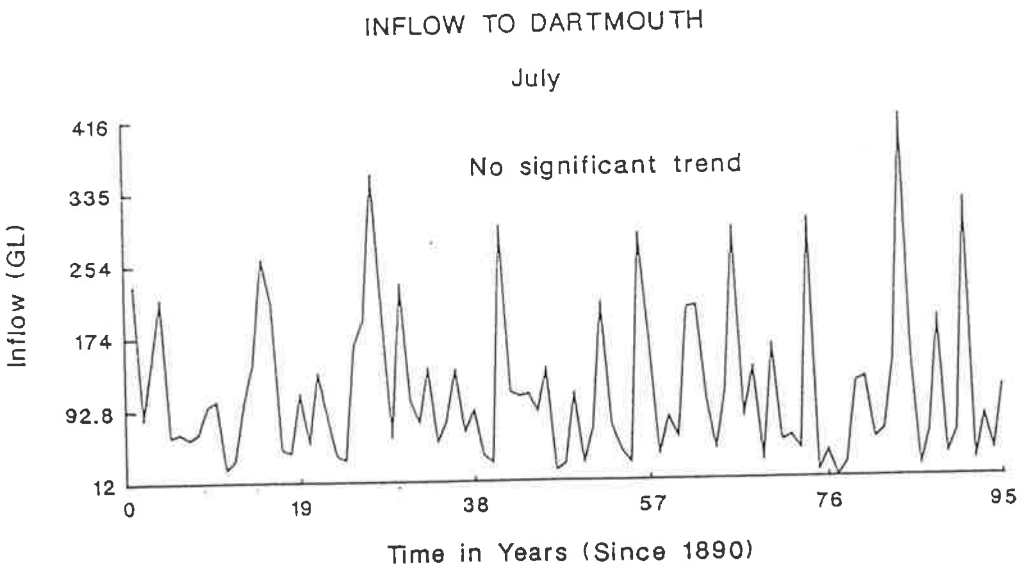

NET SNOWY DIVERSION TO HUME CATCHMENT
(January)
No significant trend
Net Diversion (GL)
189
149
109
68
28
-12
0
19
38
57
76
95
Time in Years (Since 1890)

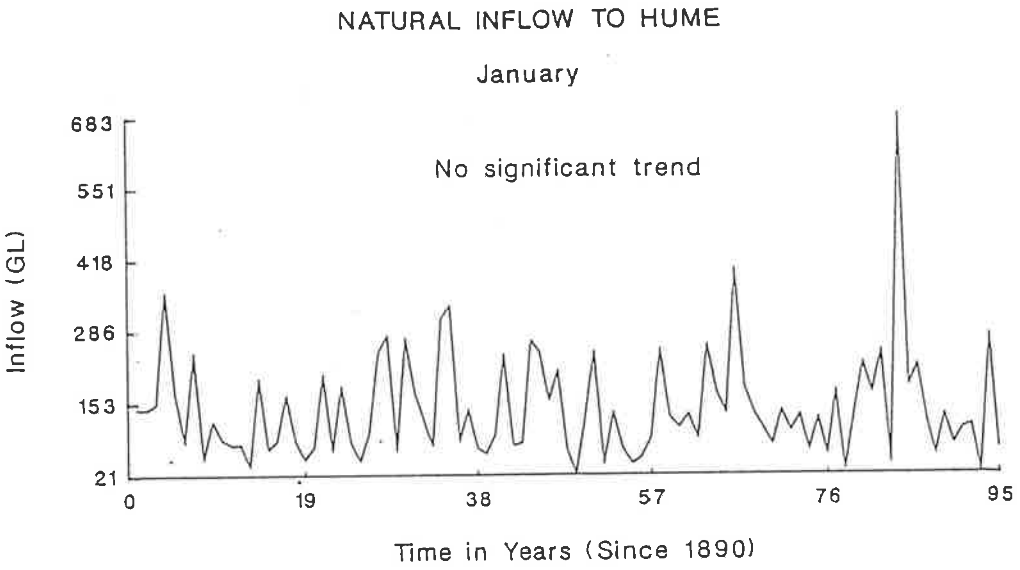

NET SNOWY DIVERSION TO HUME CATCHMENT
(July)
No significant trend
Net Diversion (GL)
175
138
101
64
27
-10
0
19
38
57
76
95
Time in Years (Since 1890)

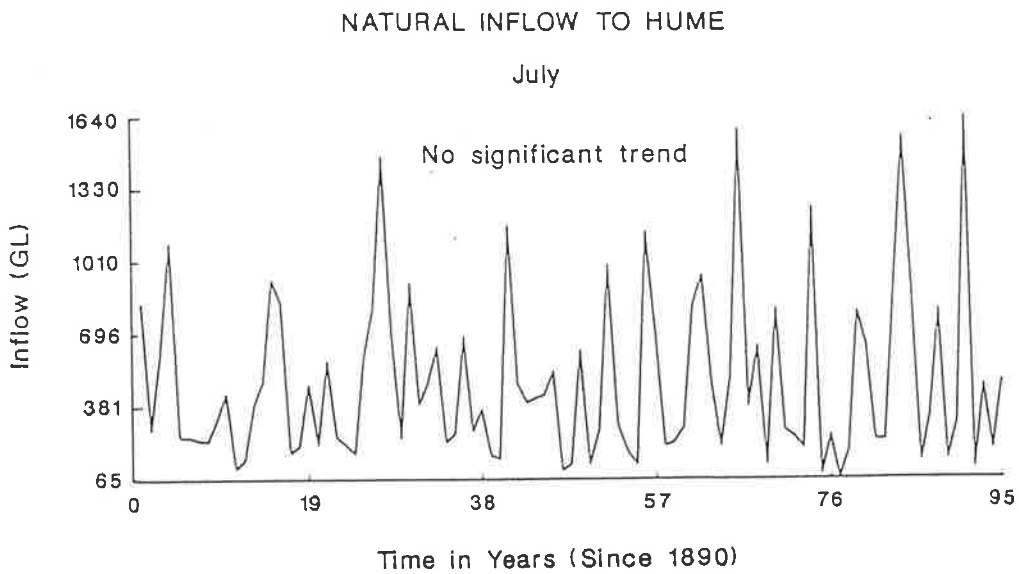

INFLOW TO MURRAY GATES
January
No significant Trend
Inflow (GL)
67
53.6
40.2
26.8
13.4
0
0
19
38
57
76
95
Time in Years (Since 1890)

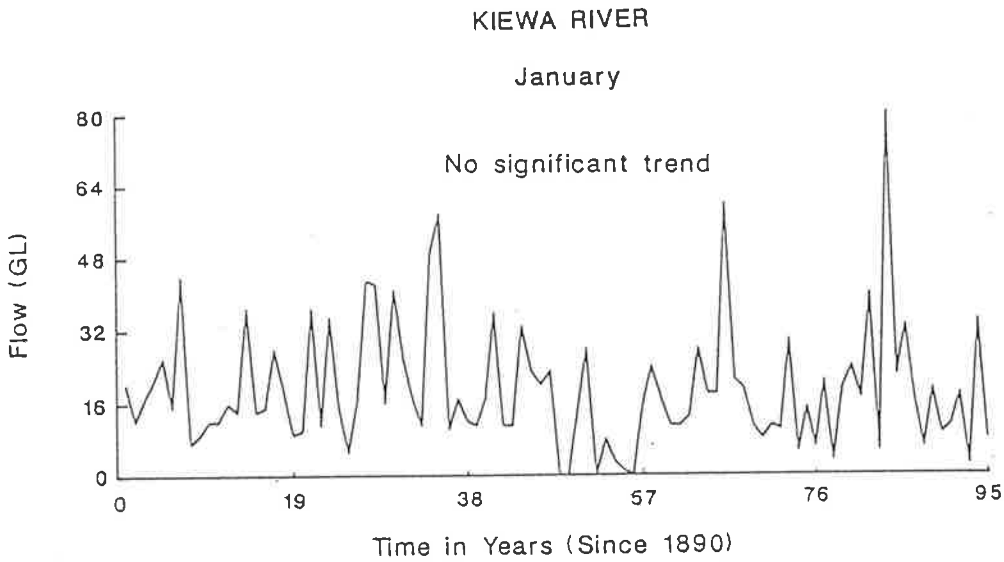

INFLOW TO MURRAY GATES
July
No significant Trend
Inflow (GL)
145
117
89.8
62.2
34.6
7
0
19
38
57
76
95
Time in Years (Since 1890)

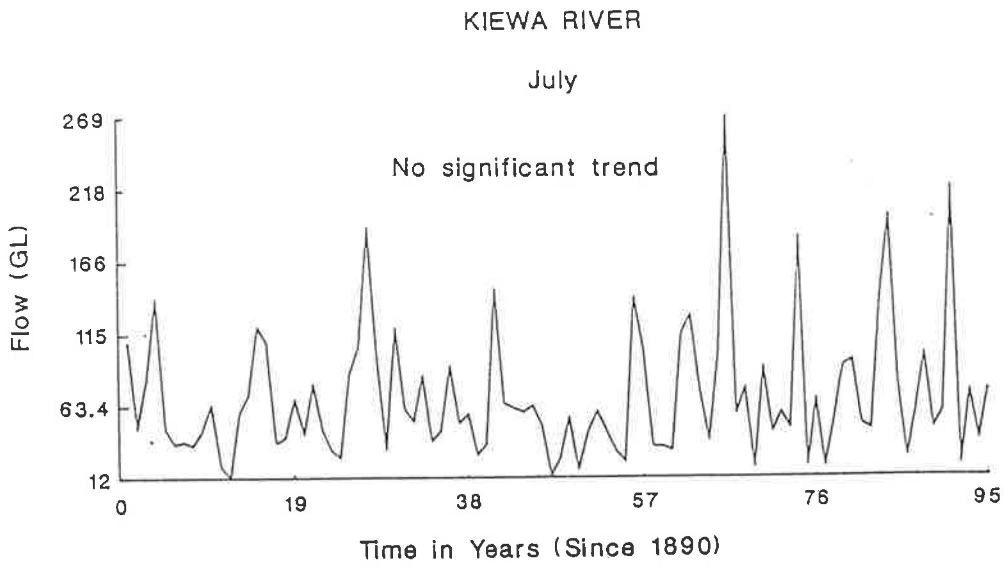

INFLOW TO DARTMOUTH
January
No significant trend
98
79.2
60.4
41.6
22.8
4
Inflow (GL)
0
19
38
57
76
95
Time in Years (Since 1890)

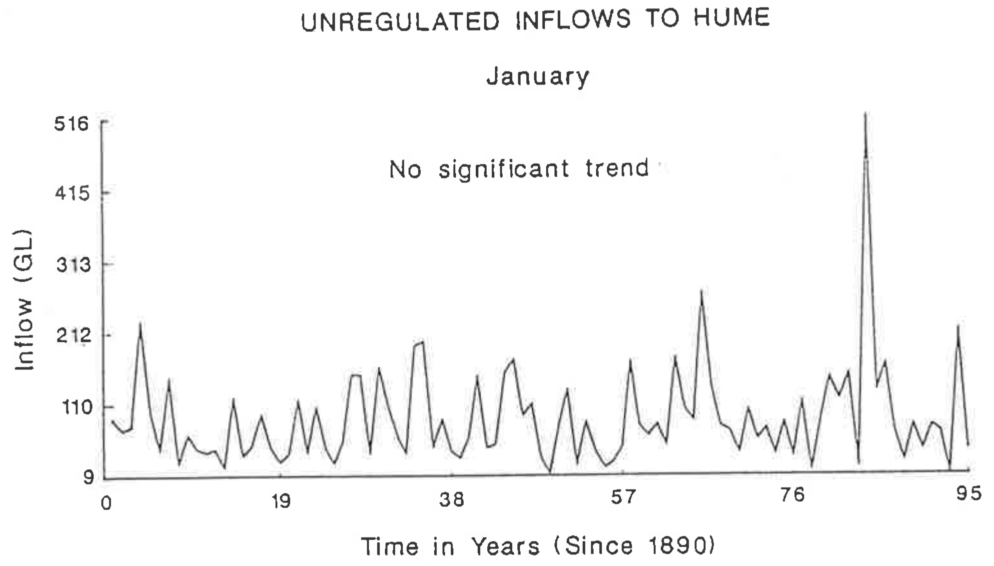

INFLOW TO DARTMOUTH
July
No significant trend
416
335
254
174
92.8
12
Inflow (GL)
0
19
38
57
76
95
Time in Years (Since 1890)

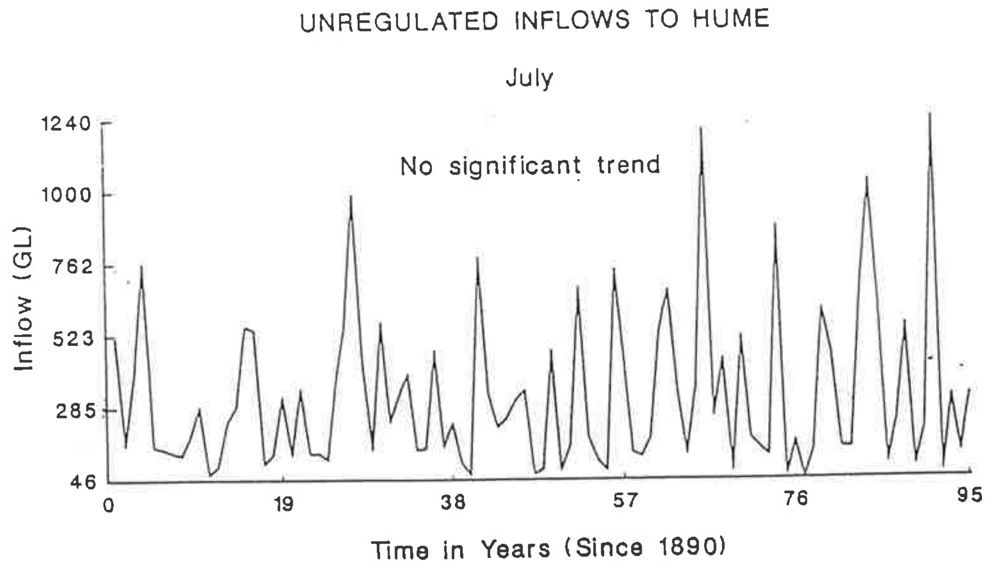

NATURAL INFLOW TO HUME
January
No significant trend
683
551
418
286
153
21
Inflow (GL)
0
19
38
57
76
95
Time in Years (Since 1890)

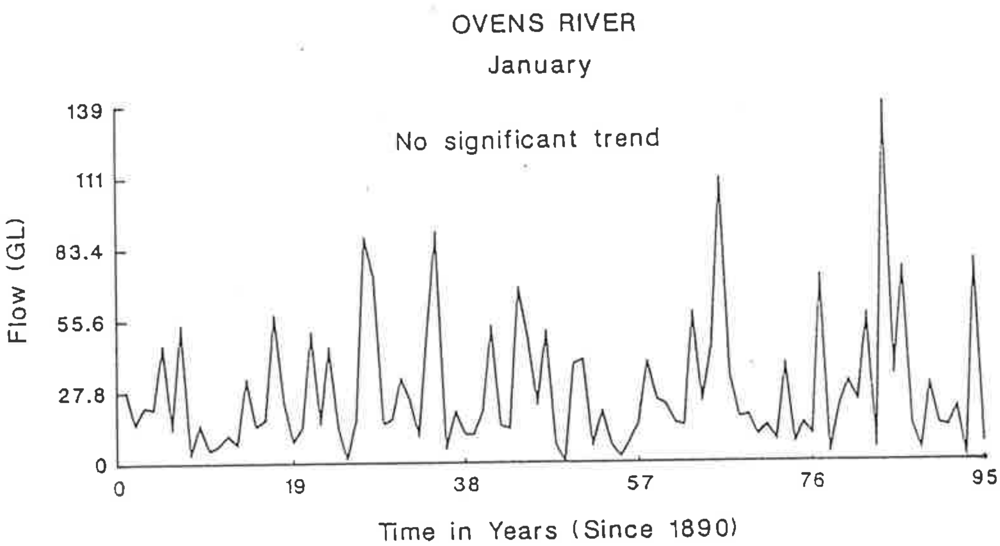

NATURAL INFLOW TO HUME
July
No significant trend
1640
1330
1010
696
381
65
Inflow (GL)
0
19
38
57
76
95
Time in Years (Since 1890)

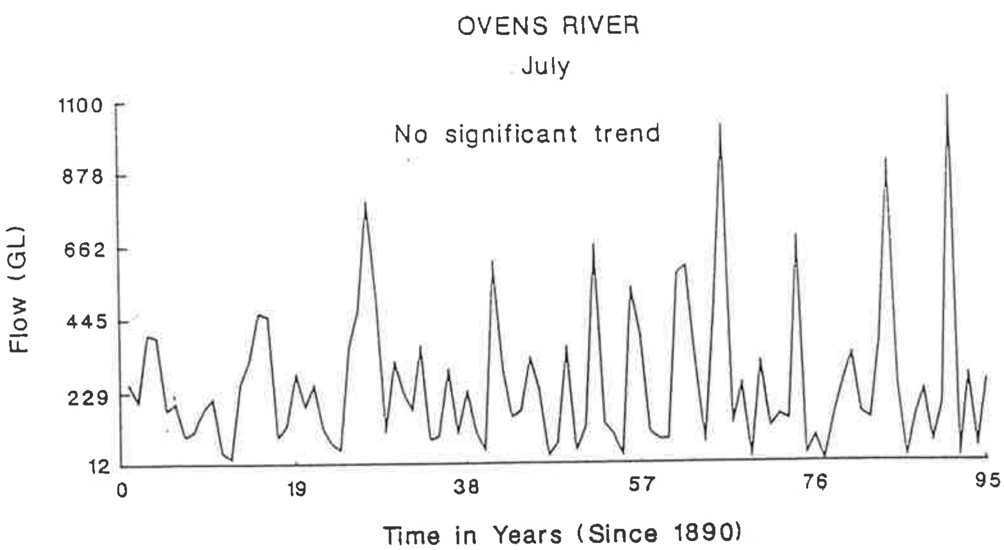

KIEWA RIVER
January
No significant trend
Flow (GL)
80
64
48
32
16
0
0
19
38
57
76
95
Time in Years (Since 1890)

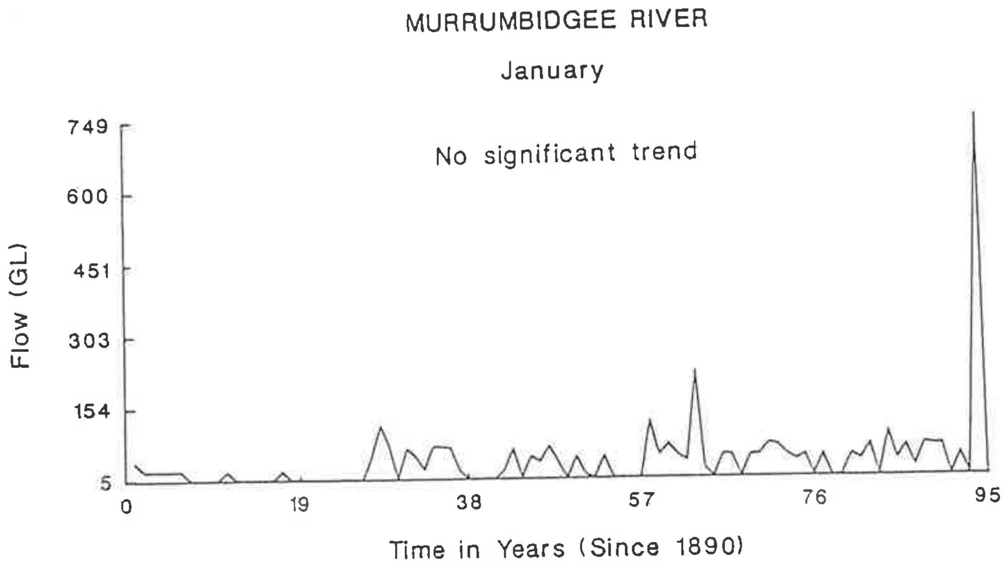

KIEWA RIVER
July
No significant trend
Flow (GL)
269
218
166
115
63.4
12
0
19
38
57
76
95
Time in Years (Since 1890)

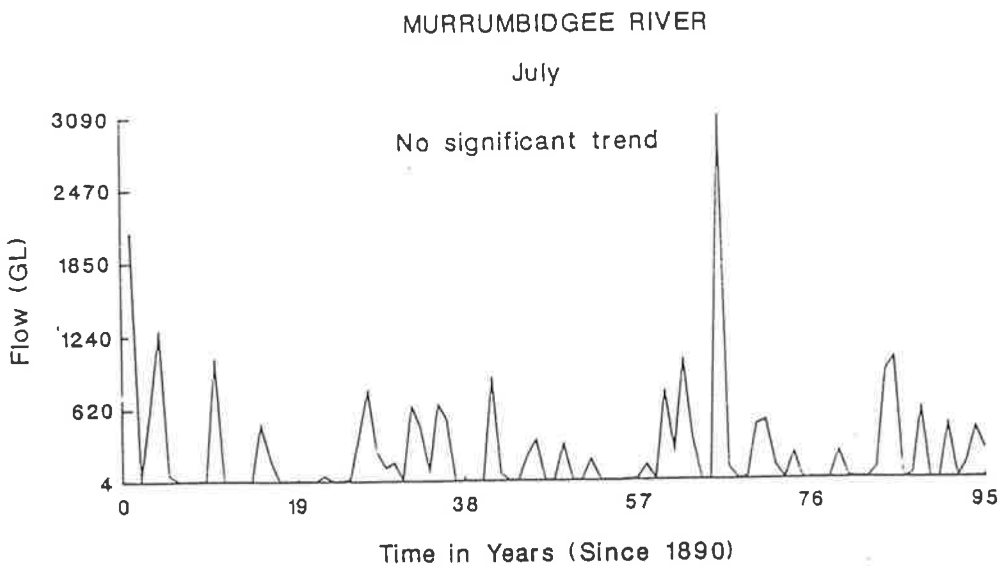

UNREGULATED INFLOWS TO HUME
January
No significant trend
Inflow (GL)
516
415
313
212
110
9
0
19
38
57
76
95
Time in Years (Since 1890)

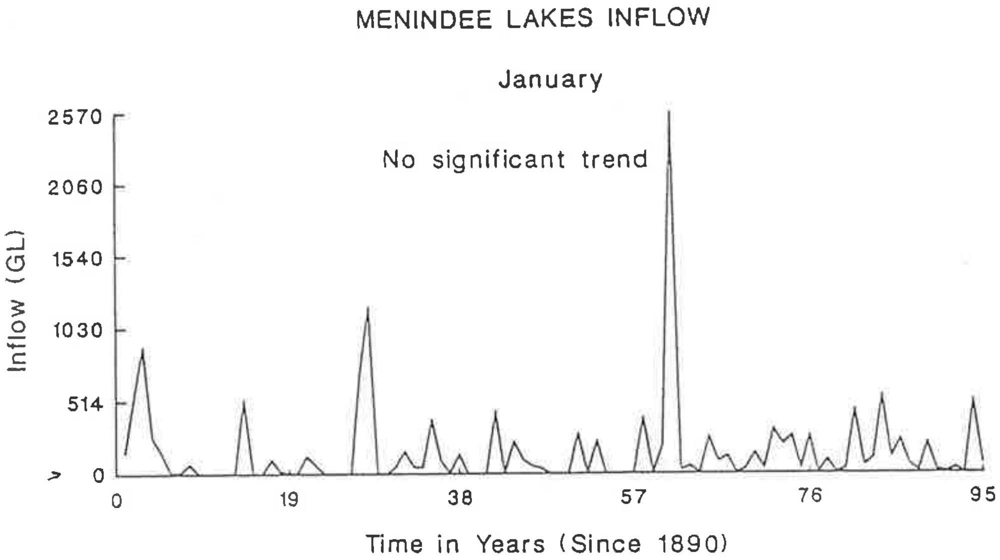

UNREGULATED INFLOWS TO HUME
July
No significant trend
Inflow (GL)
1240
1000
762
523
285
46
0
19
38
57
76
95
Time in Years (Since 1890)

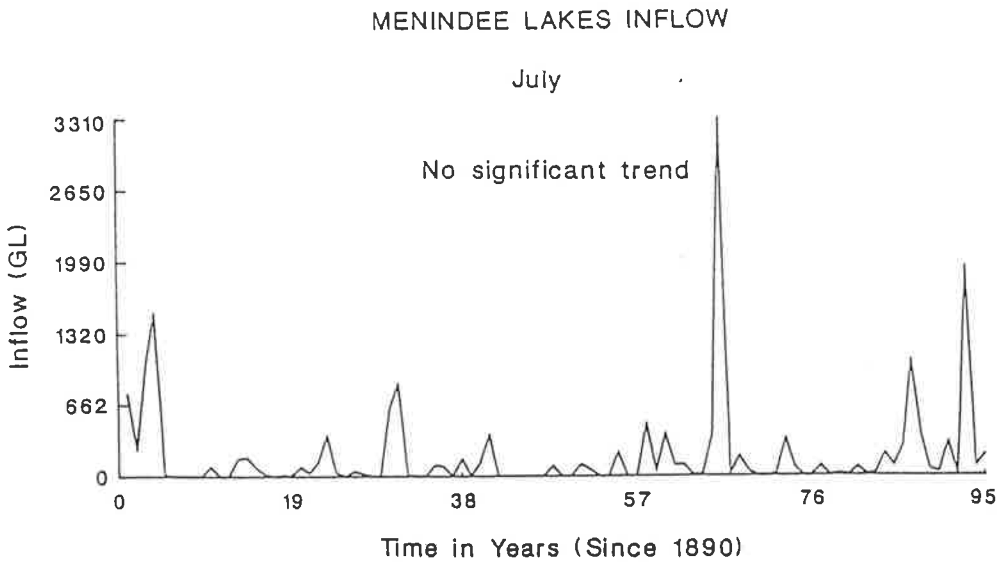

OVENS RIVER
January
No significant trend
139
111
83.4
55.6
27.8
0
Flow (GL)
0
19
38
57
76
95
Time in Years (Since 1890)

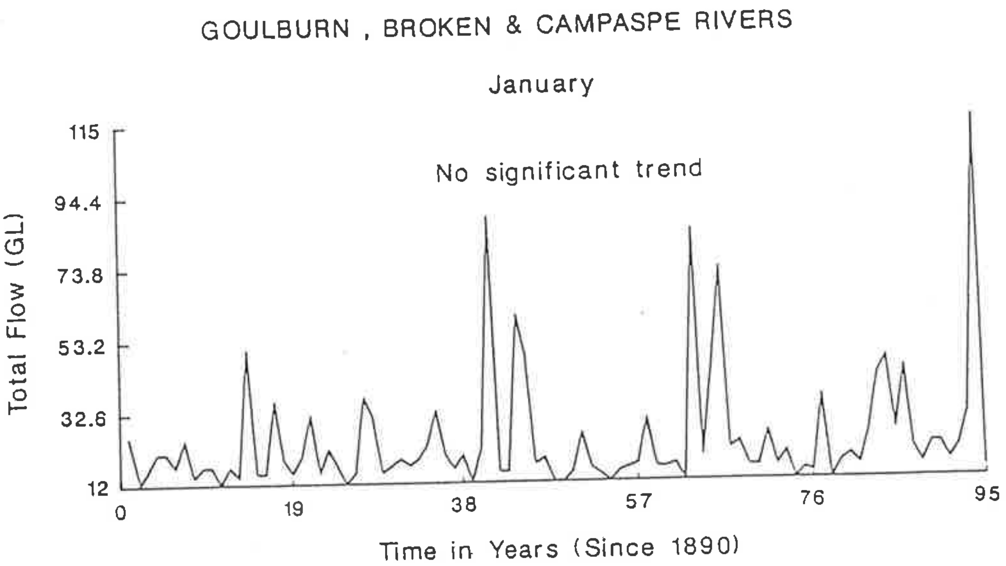

OVENS RIVER
July
No significant trend
1100
878
662
445
229
12
Flow (GL)
0
19
38
57
76
95
Time in Years (Since 1890)

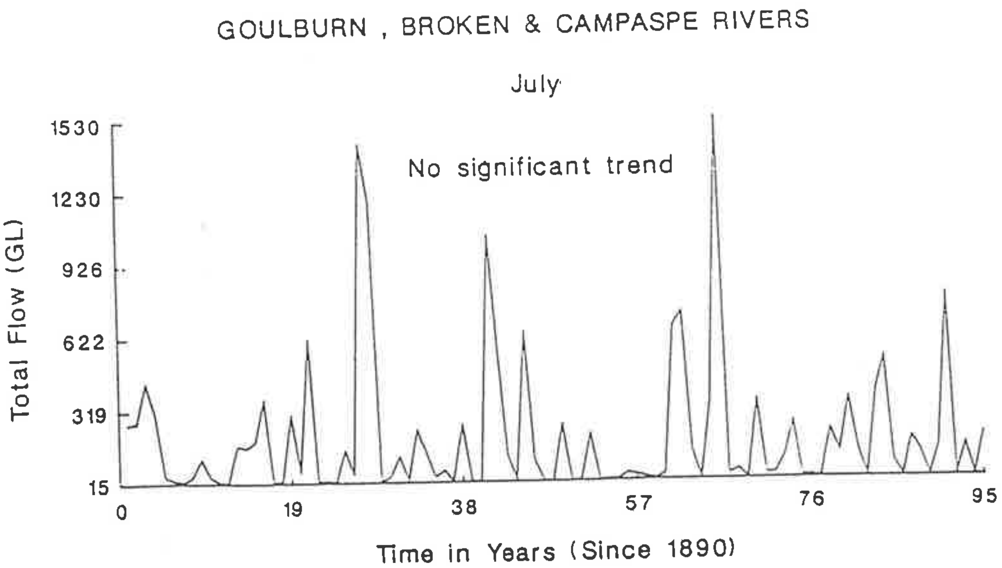

MURRUMBIDGEE RIVER
January
No significant trend
Flow (GL)
749
600
451
303
154
5
0
19
38
57
76
95
Time in Years (Since 1890)

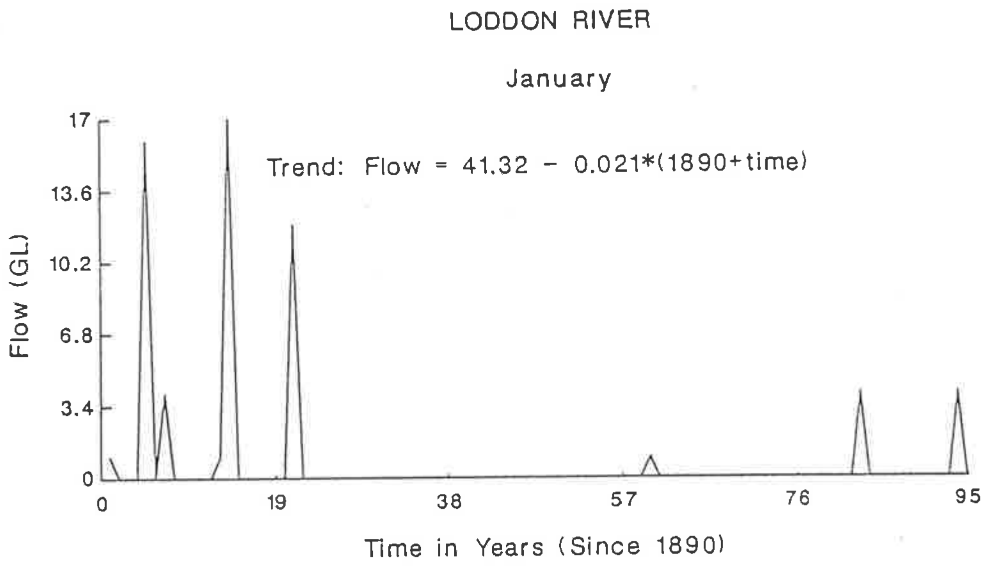

MURRUMBIDGEE RIVER
July
No significant trend
Flow (GL)
3090
2470
1850
1240
620
4
0
19
38
57
76
95
Time in Years (Since 1890)

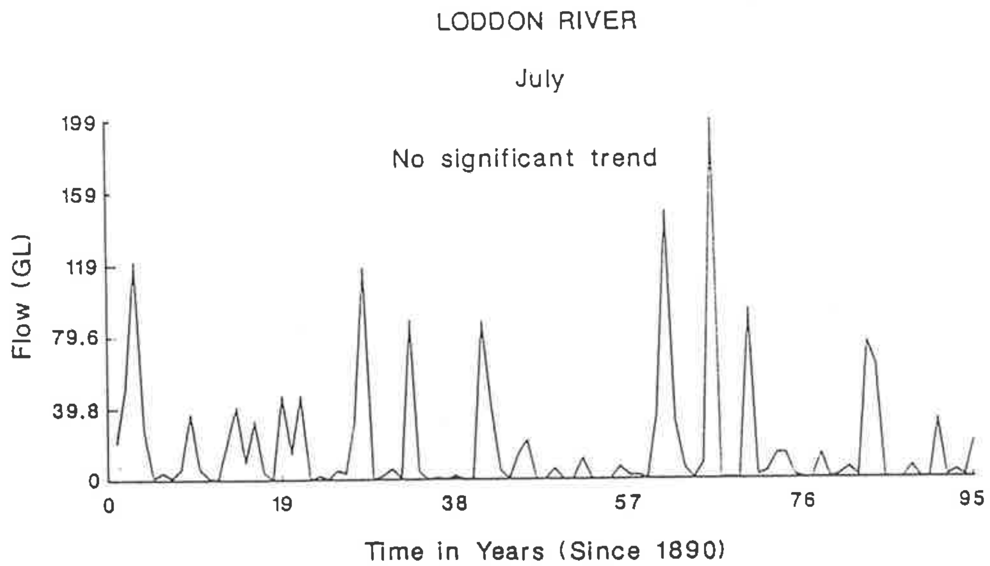

MENINDEE LAKES INFLOW
January
No significant trend
2570
2060
1540
1030
514
0
Inflow (GL)
0
19
38
57
76
95
Time in Years (Since 1890)

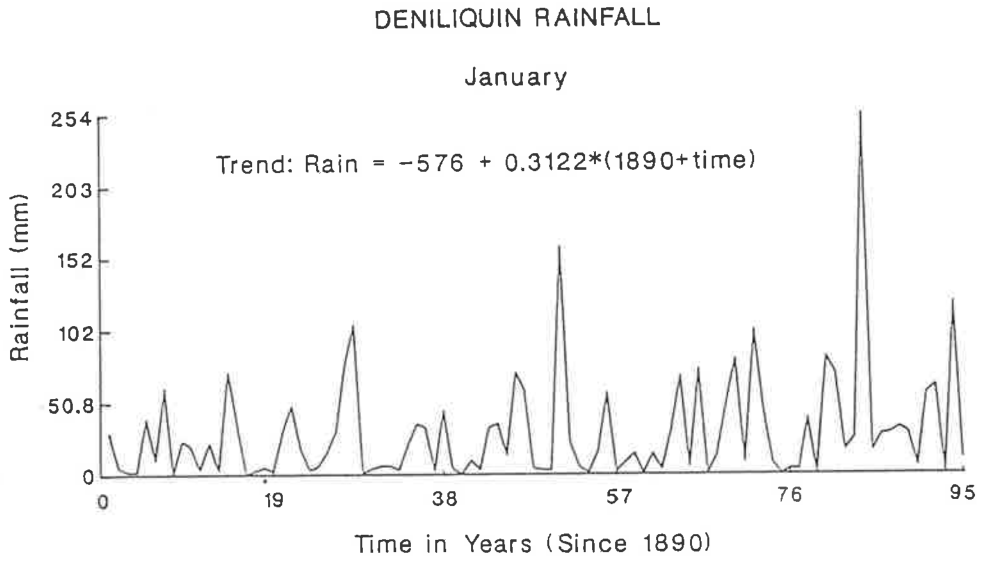

MENINDEE LAKES INFLOW
July
No significant trend
3310
2650
1990
1320
662
0
Inflow (GL)
0
19
38
57
76
95
Time in Years (Since 1890)

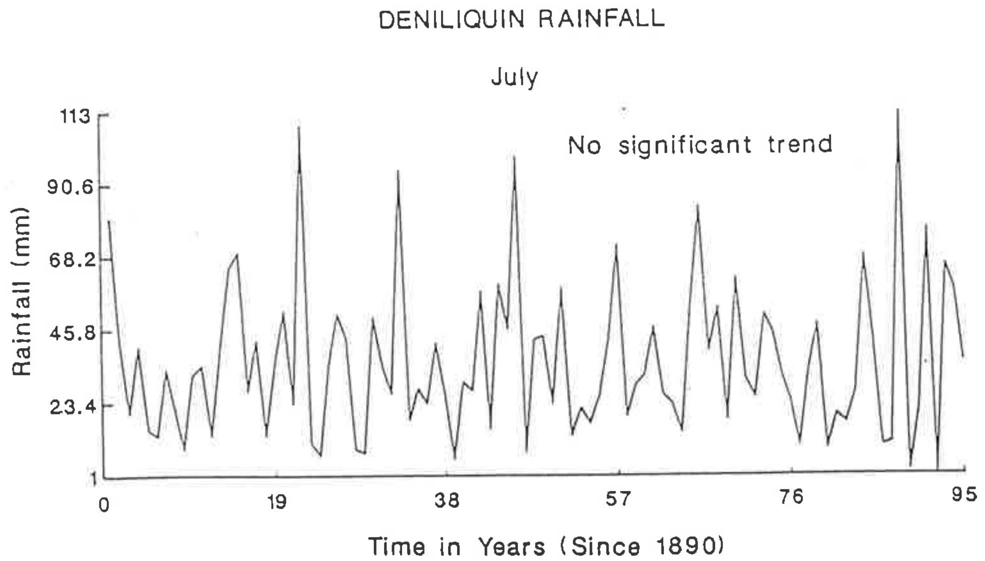

GOULBURN , BROKEN & CAMPASPE RIVERS
January
No significant trend
Total Flow (GL)
115
94.4
73.8
53.2
32.6
12
0
19
38
57
76
95
Time in Years (Since 1890)

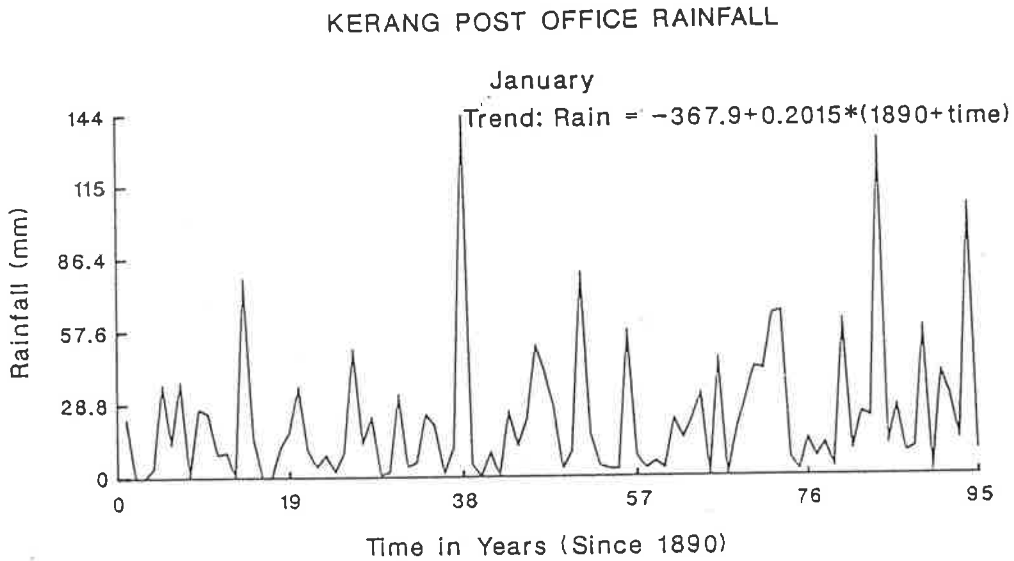

GOULBURN , BROKEN & CAMPASPE RIVERS
July
No significant trend
Total Flow (GL)
1530
1230
926
622
319
15
0
19
38
57
76
95
Time in Years (Since 1890)

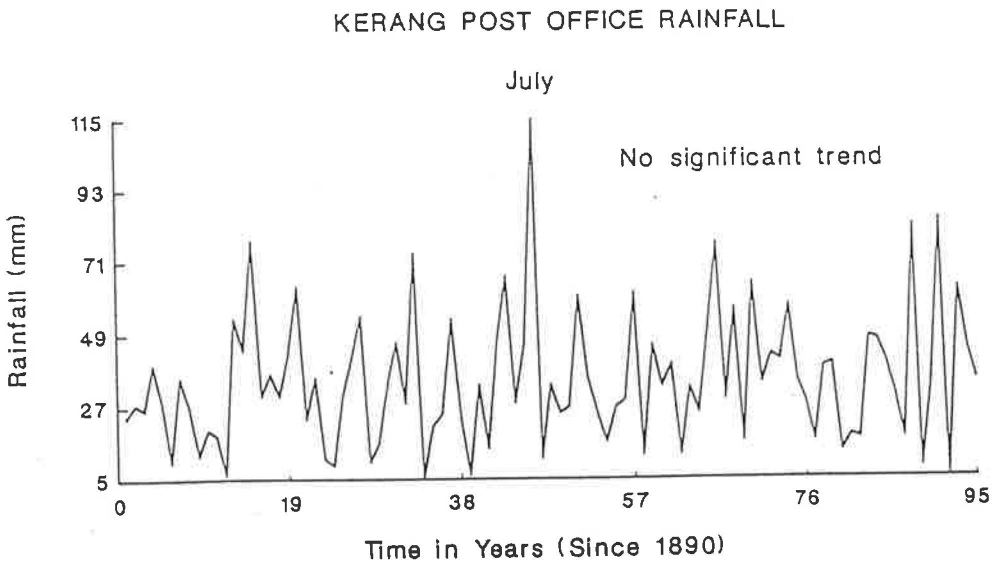

LODDON RIVER
January
Trend: Flow = 41.32 - 0.021*(1890+time)
17
13.6
10.2
6.8
3.4
0
Flow (GL)
0
19
38
57
76
95
Time in Years (Since 1890)

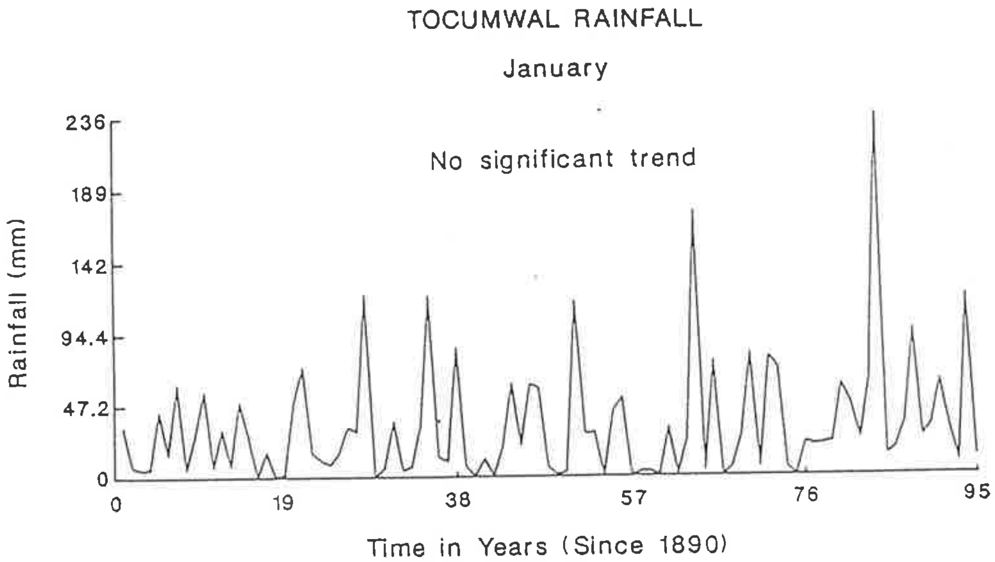

LODDON RIVER
July
No significant trend
199
159
119
79.6
39.8
0
Flow (GL)
0
19
38
57
76
95
Time in Years (Since 1890)

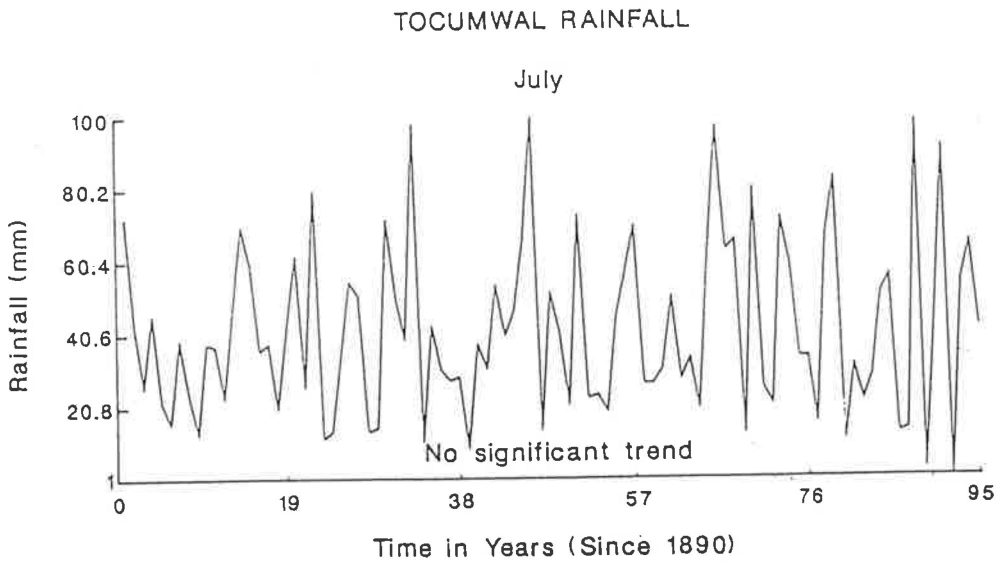

DENILIQUIN RAINFALL
January
Trend: Rain = −576 + 0.3122*(1890+time)
254
203
152
102
50.8
0
Rainfall (mm)
0
19
38
57
76
95
Time in Years (Since 1890)

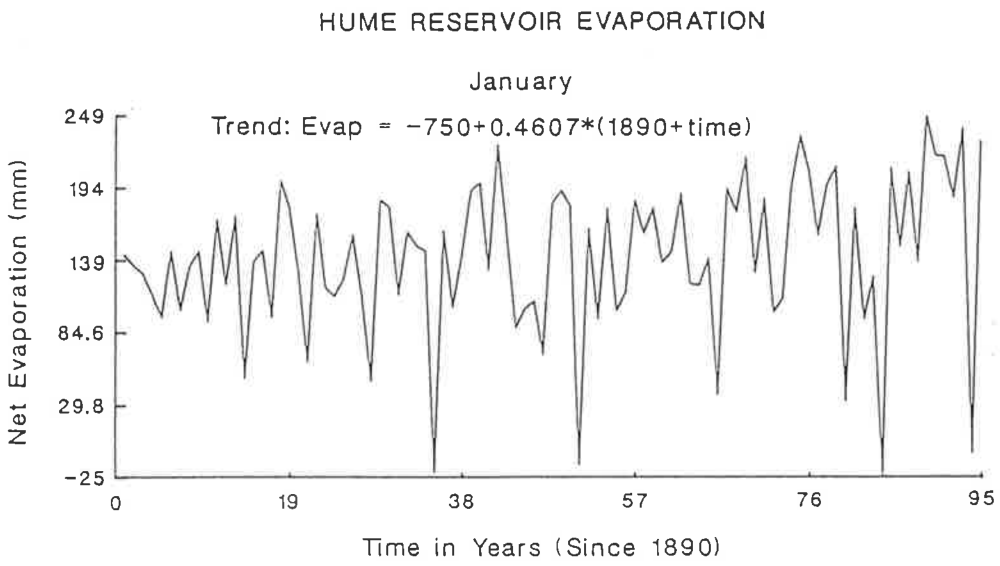

DENILIQUIN RAINFALL
July
No significant trend
113
90.6
68.2
45.8
23.4
1
Rainfall (mm)
0
19
38
57
76
95
Time in Years (Since 1890)

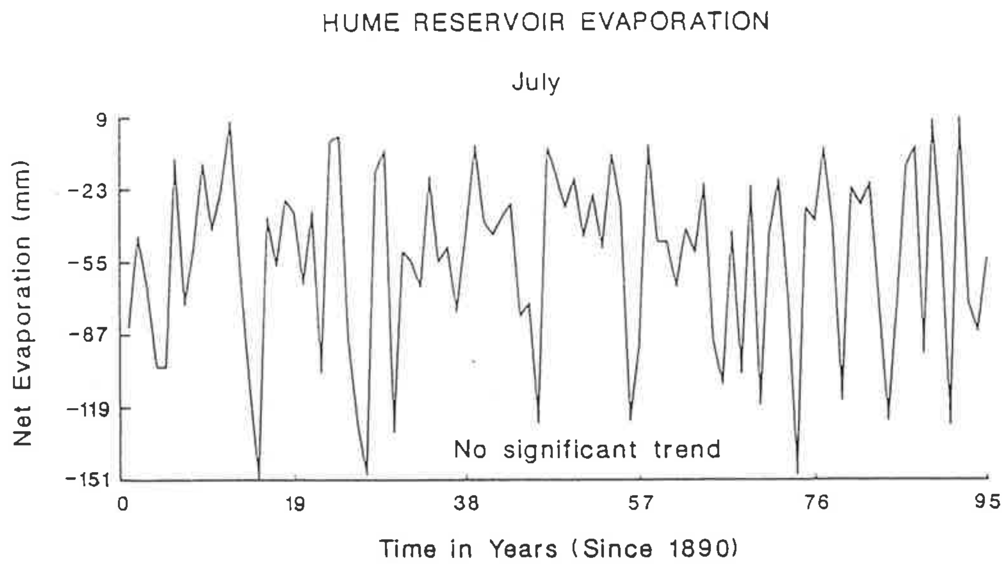

KERANG POST OFFICE RAINFALL
January
Trend: Rain = −367.9+0.2015*(1890+time)
Rainfall (mm)
144
115
86.4
57.6
28.8
0
0
19
38
57
76
95
Time in Years (Since 1890)

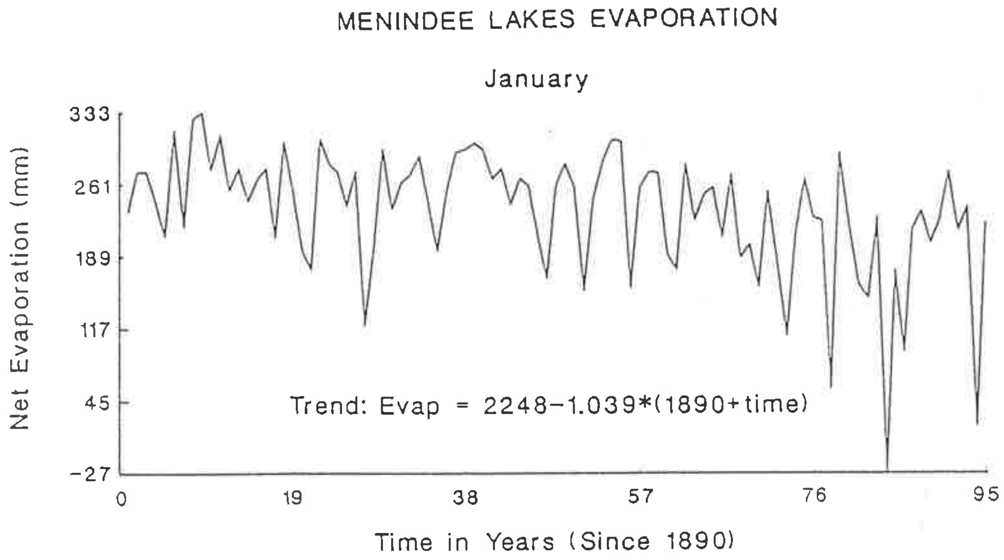

KERANG POST OFFICE RAINFALL
July
No significant trend
Rainfall (mm)
115
93
71
49
27
5
0
19
38
57
76
95
Time in Years (Since 1890)

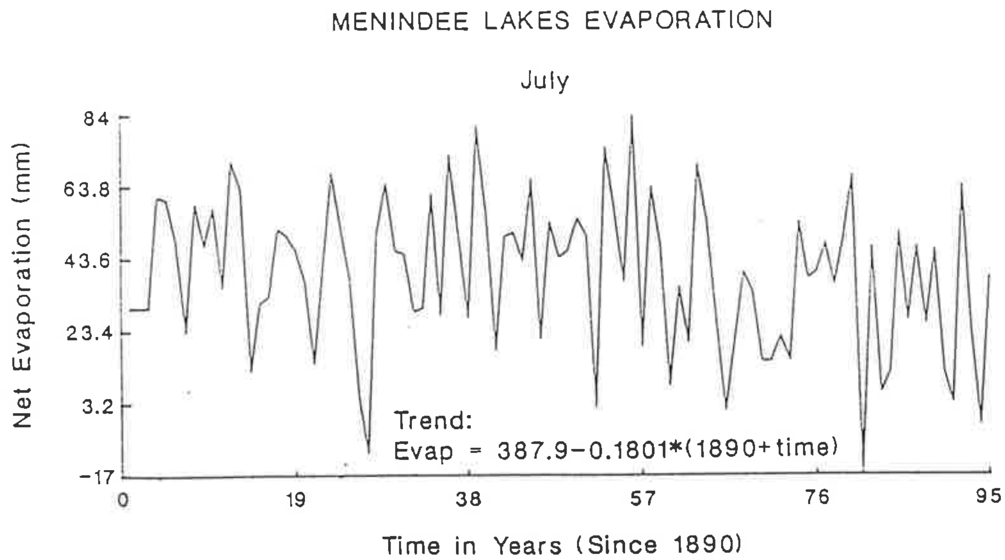

TOCUMWAL RAINFALL
January
No significant trend
Rainfall (mm)
236
189
142
94.4
47.2
0
0
19
38
57
76
95
Time in Years (Since 1890)

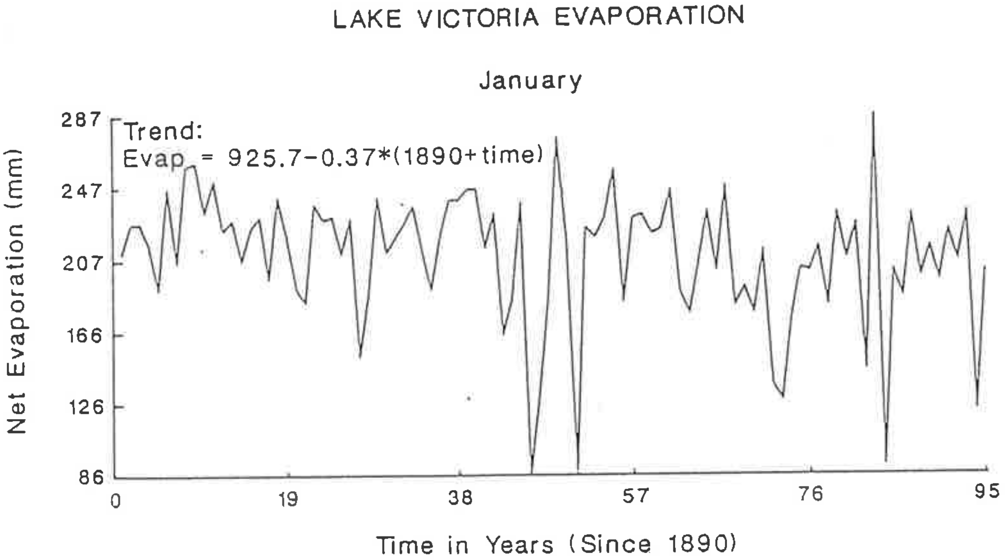

TOCUMWAL RAINFALL
July
No significant trend
Rainfall (mm)
100
80.2
60.4
40.6
20.8
1
0
19
38
57
76
95
Time in Years (Since 1890)

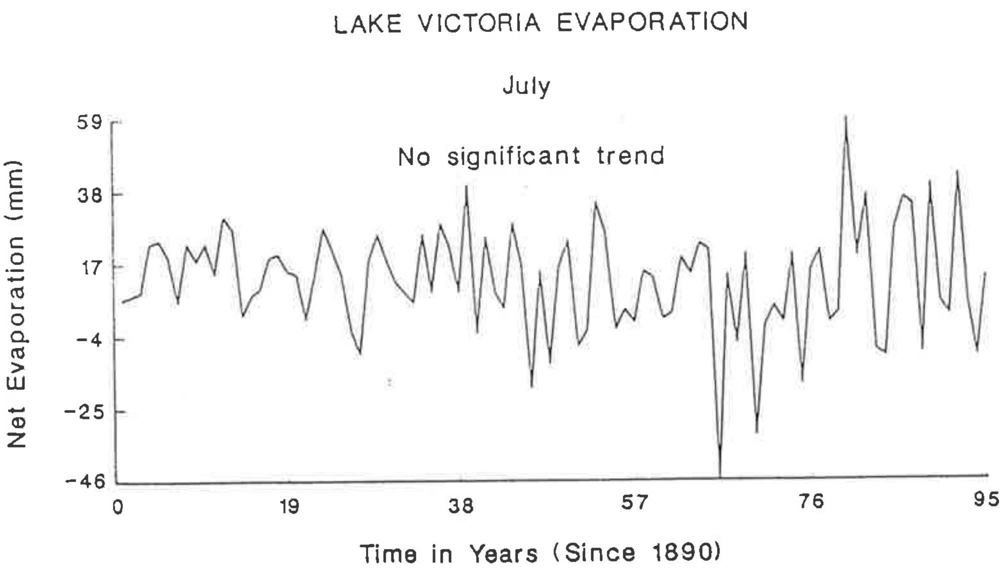

HUME RESERVOIR EVAPORATION
January
Trend: Evap = −750+0.4607*(1890+time)
Net Evaporation (mm)
249
194
139
84.6
29.8
-25
0
19
38
57
76
95
Time in Years (Since 1890)


HUME RESERVOIR EVAPORATION
July
Net Evaporation (mm)
9
-23
-55
-87
-119
-151
No significant trend
0
19
38
57
76
95
Time in Years (Since 1890)


MENINDEE LAKES EVAPORATION
January
333
261
189
117
45
-27
Net Evaporation (mm)
Trend: Evap = 2248-1.039*(1890+time)
0
19
38
57
76
95
Time in Years (Since 1890)


MENINDEE LAKES EVAPORATION
July
84
63.8
43.6
23.4
3.2
-17
Net Evaporation (mm)
Trend:
Evap = 387.9-0.1801*(1890+time)
0
19
38
57
76
95
Time in Years (Since 1890)


LAKE VICTORIA EVAPORATION
January
Trend:
Evap = 925.7-0.37*(1890+time)
287
247
207
166
126
86
Net Evaporation (mm)
0
19
38
57
76
95
Time in Years (Since 1890)


LAKE VICTORIA EVAPORATION
July
No significant trend
59
38
17
-4
-25
-46
Net Evaporation (mm)
0
19
38
57
76
95
Time in Years (Since 1890)

Appendix D

Detrending Parameters

This Appendix contains the data used to remove trends in the historical data. In most cases, the trends were not significant at the 5% level.

Significant trends are indicated in the tables by the word "Signif" appearing in the appropriate box.

DETRENDING DATA FOR NET SNOWY DIVERSION TO HUME CATCHMENT

Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	-175.8000	-204.1000	-254.5000	227.2000	802.4000	354.0000	136.4000	498.8000	-835.0000	-201.3000	-64.8600	-168.1000
$y = a + bx$	b	0.1185	0.1384	0.1629	-0.0896	-0.3593	-0.1348	-0.0240	0.2179	0.4188	0.0806	0.0382	0.1070
	r^2	0.0135	0.0295	0.0334	0.0075	0.0795	0.0093	0.0003	0.0267	0.0801	0.0019	0.0007	0.0118
						Signif				Signif			
Exponential	a		5.3630	1.6350									
$y = ae^{bx}$	b		-0.0007	0.0012									
	r^2		0.0013	0.0071									
Power	a		13.8100	-14.0000									
$y = ax^b$	b		-1.2870	2.3830									
	r^2		0.0013	0.0069									

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR INFLOW TO MURRAY GATES

Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	7.8660	-7.2370	80.4800	-21.6500	-131.6000	177.9000	-63.1000	-522.9000	-466.9000	-595.7000	-139.6000	-91.0500
$y = a + bx$	b	0.0048	0.0096	-0.0351	0.0190	0.0795	-0.0741	0.0574	0.3007	0.2771	0.3452	0.0954	0.0609
	r^2	0.0001	0.0015	0.0134	0.0012	0.0196	0.0051	0.0024	0.0545	0.0557	0.0579	0.0129	0.0111
									Signif	Signif	Signif		
Exponential	a		3.0190	7.3520	5.1470	-0.6267	9.3710	5.5740	-4.4510	-2.4780	-3.5160	-1.4330	
$y = ae^{bx}$	b		-0.0004	-0.0026	-0.0014	0.0018	-0.0031	-0.0010	0.0043	0.0034	0.0040	0.0026	
	r^2		0.0003	0.0108	0.0026	0.0070	0.0174	0.0016	0.0373	0.0385	0.0418	0.0117	
Power	a		7.9720	40.4000	22.9000	-23.8600	49.3900	18.1900	59.5100	-45.7600	-53.8300	-34.8600	
$y = ax^b$	b		-0.7576	-5.0320	-2.7040	3.5390	-6.0890	-1.9200	8.3790	6.5930	7.6610	5.0880	
	r^2		0.0002	0.0108	0.0025	0.0070	0.0176	0.0016	0.0000	0.0000	0.0000	0.0000	

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR INFLOW TO DARTMOUTH

Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	235.9000	154.8000	250.5000	26.2500	-127.5000	744.8000	317.6000	265.4000	-23.0800	-161.5000	-76.5500	150.7000
$y = a + bx$	b	-0.1062	-0.0692	-0.1178	0.0016	0.0893	-0.3436	-0.1067	0.2083	0.0922	0.1639	0.0869	-0.0520
	r^2	0.0192	0.0155	0.0312	0.0000	0.0035	0.0150	0.0012	0.0043	0.0011	0.0024	0.0017	0.0020
Exponential	a	10.9100	10.3300	11.6400	7.1090	2.3860	13.4200	11.1300	1.9400	3.4680	2.5880	3.5040	7.3530
$y = ae^{bx}$	b	-0.0040	-0.0039	-0.0045	-0.0021	0.0006	-0.0048	-0.0035	0.0014	0.0007	0.0012	0.0004	-0.0019
	r^2	0.0241	0.0223	0.0287	0.0055	0.0005	0.0300	0.0158	0.0035	0.0015	0.0030	0.0003	0.0062
Power	a	61.7500	59.7400	69.4100	33.7900	-5.0690	74.9400	55.1200	-16.3800	-5.8990	-12.5900	-1.9170	31.3000
$y = ax^b$	b	-7.7400	-7.5240	-8.7960	-4.0640	1.1370	-9.3650	-6.6960	2.7880	1.4290	2.3100	0.8226	-3.6440
	r^2	0.0241	0.0222	0.0286	0.0055	0.0005	0.0300	0.0158	0.0035	0.0014	0.0030	0.0003	0.0062

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR NATURAL INFLOW TO HUME													
Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	-194.5000	61.1000	400.5000	-311.8000	-1419.0000	1669.0000	-1410.0000	-5113.0000	-2397.0000	-3515.0000	-1250.0000	-573.7000
$y = a + bx$	b	0.1735	0.0152	-0.1568	0.2260	0.8343	-0.6889	0.9779	2.9490	1.5940	2.1840	0.8643	0.4161
	r^2	0.0023	0.0001	0.0042	0.0022	0.0198	0.0037	0.0054	0.0418	0.0157	0.0201	0.0091	0.0064
									Signif				
Exponential	a	4.8880	6.3890	7.0380	3.9670	0.3550	10.2500	6.4910	-1.8050	3.2690	1.6330	1.9580	3.4160
$y = ae^{bx}$	b	-0.0001	-0.0011	-0.0014	0.0003	0.0028	-0.0024	-0.0003	0.0041	0.0016	0.0025	0.0020	0.0010
	r^2	0.0000	0.0020	0.0032	0.0002	0.0137	0.0086	0.0001	0.0268	0.0068	0.0129	0.0059	0.0017
Power	a	5.8190	19.9300	24.6100	0.0035	-35.8500	41.3700	10.2800	-54.3000	-17.1400	-29.7200	-23.6500	-8.8710
$y = ax^b$	b	-0.1422	-2.0640	-2.6750	0.6037	5.4040	-4.7360	-0.5771	7.9910	3.1100	4.7730	3.8970	1.8670
	r^2	0.0000	0.0019	0.0032	0.0002	0.0000	0.0087	0.0001	0.0000	0.0067	0.0128	0.0060	0.0017

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR INFLOW TO MURRAY FROM THE KIEWA

Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	74.3600	77.7700	206.1000	24.1500	-374.7000	101.5000	-321.8000	-844.8000	-278.8000	-375.7000	-59.5600	-19.5700
$y = a + bx$	b	-0.0286	-0.0335	-0.0988	-0.0018	0.2110	-0.0255	0.2018	0.4783	0.1956	0.2477	0.0636	0.0263
	r^2	0.0032	0.0075	0.0437	0.0000	0.0292	0.0003	0.0139	0.0670	0.0122	0.0143	0.0023	0.0014
				Signif					Signif				
Exponential	a						6.0970	0.6518	-7.2590	2.2680	1.0830	3.7360	
$y = ae^{bx}$	b						-0.0012	0.0017	0.0059	0.0011	0.0018	0.0001	
	r^2						0.0026	0.0057	0.0652	0.0039	0.0075	0.0000	
Power	a						21.8500	-21.4500	-82.5700	-12.0200	-21.3000	2.2350	
$y = ax^b$	b						-2.3940	3.3680	11.4700	2.1810	3.4090	0.2275	
	r^2						0.0026	0.0056	0.0000	0.0038	0.0074	0.0000	

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR UNREGULATED INFLOWS TO HUME													
Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	-500.0000	-65.4200	106.3000	-260.6000	-1013.0000	729.9000	-1910.0000	-4795.0000	-2137.0000	-2728.0000	-810.1000	-711.1000
$y = a + bx$	b	0.3037	0.0625	-0.0251	0.1724	0.5828	-0.2693	1.1510	2.6800	1.3230	1.6310	0.5531	0.4415
	r^2	0.0143	0.0023	0.0003	0.0034	0.0241	0.0012	0.0147	0.0650 Signif	0.0217	0.0238	0.0087	0.0156
Exponential	a	2.1150	6.5760	6.0700	2.5190	-2.8030	8.6020	3.2770	-4.7990	2.5800	0.9168	1.7520	1.2310
$y = ae^{bx}$	b	0.0011	0.0014	0.0012	0.0008	0.0038	-0.0018	0.0011	0.0054	0.0017	0.0026	0.0018	0.0018
	r^2	0.0017	0.0027	0.0018	0.0010	0.0241	0.0045	0.0015	0.0382	0.0057	0.0112	0.0043	0.0046
Power	a	-11.8500	24.7300	20.8200	-7.3390	-50.8100	32.3200	-11.0100	-73.9600	-18.9200	-31.5600	-21.8200	-22.0600
$y = ax^b$	b	2.1250	-2.7660	-2.2450	1.5020	7.3080	-3.6070	2.1760	10.5300	3.2760	4.9440	3.5870	3.5410
	r^2	0.0017	0.0027	0.0018	0.0010	0.0000	0.0046	0.0015	0.0000	0.0056	0.0111	0.0043	0.0047

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR TOTAL OVENS INFLOW

Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	-124.1000	-57.5400	-47.6800	-449.0000	-902.3000	1370.0000	-675.2000	-3729.0000	-1341.0000	-2433.0000	-727.5000	-429.9000
$y = a + bx$	b	0.0781	0.0381	0.0344	0.2495	0.5004	-0.6327	0.4772	2.0890	0.8380	1.3730	0.4385	0.2547
	r^2	0.0071	0.0022	0.0019	0.0094	0.0151	0.0114	0.0036	0.0595	0.0174	0.0459	0.0143	0.0104
									Signif		Signif		
Exponential	a						18.3100	10.3100	-5.8310	1.0000	-3.5040	1.0540	2.0470
$y = ae^{bx}$	b						-0.0072	-0.0027	0.0058	0.0023	0.0044	0.0017	0.0008
	r^2						0.0334	0.0060	0.0376	0.0065	0.0190	0.0023	0.0005
Power	a						109.6000	44.2900	-80.1700	-27.7600	-60.0500	-21.4500	-9.1010
$y = ax^b$	b						-13.9000	-5.1730	11.3100	4.3820	8.6060	3.4180	1.6900
	r^2						0.0000	0.0060	0.0000	0.0064	0.0000	0.0024	0.0005

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR MURRUMBIDGEE INFLOW TO MURRAY													
Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	-1568.0000	-598.0000	-933.6000	-933.7000	-1239.0000	659.2000	1242.0000	-2373.0000	-3989.0000	-5982.0000	-2628.0000	-893.0000
$y = a + bx$	b	0.8309	0.3234	0.5055	0.5131	0.6730	-0.2551	-0.5118	1.3580	2.1820	3.2050	1.4090	0.4839
	r^2	0.0794	0.1250	0.0094	0.0055	0.0076	0.0003	0.0009	0.0105	0.0306	0.0482	0.0490	0.0328
			Signif										
Exponential	a	≈ 0.0	-19.7900	≈ 0.0	≈ 0.0	-16.7100	-10.0500	-6.7010	-20.0700	-19.3600	≈ 0.0	≈ 0.0	≈ 0.0
$y = ae^{bx}$	b	0.0156	0.0117	0.0107	0.0122	0.0098	0.0067	0.0053	0.0123	0.0120	0.0183	0.0199	0.0137
	r^2	0.0000	0.0994	0.0000	0.0000	0.0323	0.0089	0.0044	0.0227	0.0238	0.0000	0.0000	0.0000
Power	a	-226.1000	-169.1000	-154.2000	-177.1000	-142.1000	-95.4300	-74.1800	-176.4000	-171.4000	-265.1000	-289.0000	-198.3000
$y = ax^b$	b	30.2600	22.7300	20.7700	23.7400	19.0900	13.0100	10.2800	23.7900	23.1600	35.4800	38.5700	26.5800
	r^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR INFLOW TO MENINDEE LAKES													
Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	-86.5900	-3545.0000	-5020.0000	-9617.0000	-2198.0000	-944.7000	-1719.0000	1215.0000	2498.0000	2119.0000	2912.0000	-208.4000
$y = a + bx$	b	0.1253	1.9090	2.7100	5.1070	1.2440	0.5564	0.9859	-0.4874	-1.1430	-0.9788	-1.4160	0.1896
	r^2	0.0001	0.0372	0.0309	0.0473	0.0047	0.0015	0.0036	0.0006	0.0025	0.0034	0.0143	0.0003
					Signif								
Exponential	a												
$y = ae^{bx}$	b												
	r^2												
Power	a												
$y = ax^b$	b												
	r^2												

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR INFLOWS FROM GOULBURN, BROKEN AND CAMPASPE													
Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	-198.1000	-222.1000	-116.2000	-321.0000	-965.4000	131.8000	256.3000	-3011.0000	-1067.0000	-2379.0000	-887.1000	-312.7000
$y = a + bx$	b	0.1146	0.1242	0.0709	0.1789	0.5221	-0.0172	-0.0315	1.7000	0.6921	1.3380	0.5141	0.1870
	r^2	0.0338	0.0622	0.0136	0.0184	0.0202	0.0000	0.0000	0.0166	0.0031	0.0137	0.0066	0.0034
Exponential	a	-2.9790	0.0040	-1.8840	0.0016	≈ 0.0	5.0160	4.1620	-3.6180	0.0414	-10.3800	-6.3800	-3.8630
$y = ae^{bx}$	b	0.0031	0.0043	0.0025	0.0049	0.0078	-0.0007	0.0001	0.0043	0.0024	0.0076	0.0053	0.0037
	r^2	0.0316	0.0703	0.0219	0.0533	0.0000	0.0003	0.0000	0.0075	0.0023	0.0232	0.0142	0.0146
			Signif		Signif								
Power	a	-42.3900	-59.8800	-33.4700	-68.4900	-111.3000	13.7100	3.2920	-58.4300	-30.1700	-106.9000	-73.2600	-51.6500
$y = ax^b$	b	6.0020	8.2800	4.8050	9.4400	15.1300	-1.3210	0.1417	8.3550	4.6150	14.7000	10.1800	7.2680
	r^2	0.0000	0.0000	0.0220	0.0000	0.0000	0.0003	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR INFLOWS FROM LODDON

Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	41.3200	10.2500	-13.2300	-3.7740	-30.0500	212.6000	191.1000	67.5400	231.1000	-102.7000	-25.1100	104.3000
$y = a + bx$	b	-0.0210	-0.0050	0.0070	0.0020	0.0166	-0.1055	-0.0891	-0.0199	-0.1041	0.0620	0.0162	-0.0514
	r^2	0.0449	0.0022	0.0225	0.0261	0.0045	0.0185	0.0050	0.0001	0.0038	0.0022	0.0007	0.0022
		Signif											
Exponential	a												
$y = ae^{bx}$	b												
	r^2												
Power	a												
$y = ax^b$	b												
	r^2												

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR DENILIQUIN RAINFALL

Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	-576.0000	-42.3400	-115.3000	12.6500	-22.3900	582.7000	-19.1500	-27.9500	-129.0000	-78.6000	-123.0000	-75.0800
$y = a + bx$	b	0.3122	0.0354	0.0753	0.0079	0.0316	-0.2791	0.0285	0.0338	0.0848	0.0612	0.0775	0.0543
	r^2	0.0491	0.0011	0.0041	0.0001	0.0008	0.0921	0.0011	0.0017	0.0100	0.0034	0.0070	0.0022
		Signif											
Exponential	a						5.8460	6.3710	0.4526	0.1224			
$y = ae^{bx}$	b						-0.0086	-0.0016	0.0015	0.0017			
	r^2						0.1112	0.0029	0.0030	0.0040			
							Signif						
Power	a						129.7000	26.0900	-18.5600	-20.7100			
$y = ax^b$	b						-16.6800	-3.0060	2.9010	3.1770			
	r^2						0.0000	0.0028	0.0029	0.0039			

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR KERANG POST OFFICE RAINFALL

Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	-367.9000	-20.7500	-199.2000	-103.0000	-18.3400	509.7000	-169.3000	-225.4000	-86.8600	-331.7000	-257.5000	206.5000
$y = a + bx$	b	0.2015	0.0235	0.1178	0.0656	0.0281	-0.2440	0.1054	0.1354	0.0628	0.1913	0.1462	-0.0938
	r^2	0.0419	0.0004	0.0115	0.0074	0.0009	0.0936	0.0203	0.0316	0.0064	0.0312	0.0424	0.0087
		Signif										Signif	
Exponential	a						3.2010	-2.1730	2.4790				
$y = ae^{bx}$	b						-0.0095	0.0029	0.0030				
	r^2						0.1185	0.0142	0.0120				
							Signif						
Power	a						143.4000	38.6700	40.5400				
$y = ax^b$	b						18.5000	5.5540	5.8050				
	r^2						0.0000	0.0000	0.0000				

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR TOCUMWAL RAINFALL

Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	-526.1000	-201.0000	-91.0500	-86.7400	-40.9200	686.8000	-106.9000	-32.0100	-92.3500	-329.3000	-125.9000	-45.7700
$y = a + bx$	b	0.2886	0.1176	0.0656	0.0616	0.0423	-0.3305	0.0765	0.0393	0.0673	0.1935	0.0809	0.0403
	r^2	0.0400	0.0081	0.0022	0.0035	0.0012	0.1119	0.0080	0.0019	0.0071	0.0250	0.0063	0.0011
Exponential	a						1.7920	5.8810	3.6920	1.2310			
$y = ae^{bx}$	b						-0.0103	-0.0012	-0.0001	0.0011			
	r^2						0.1375	0.0021	0.0000	0.0021			
							Signif						
Power	a						154.8000	21.1200	4.6440	-13.0500			
$y = ax^b$	b						-19.9800	-2.3260	-0.1427	2.1790			
	r^2						0.0000	0.0020	0.0000	0.0020			

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR HUME EVAPORATION													
Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	-750.0000	-1273.0000	-937.2000	556.8000	138.4000	-1103.0000	-103.0000	-33.1000	-138.6000	-240.6000	-611.8000	-1160.0000
$y = a + bx$	b	0.4607	0.7114	0.5222	-0.2732	-0.0837	0.5422	0.0253	-0.0055	0.0648	0.1319	0.3535	0.6591
	r^2	0.0484	0.1175	0.0760	0.0264	0.0031	0.1282	0.0003	0.0000	0.0030	0.0054	0.0375	0.0940
		Signif	Signif	Signif			Signif						Signif
Exponential	a												
$y = ae^{bx}$	b												
	r^2												
Power	a												
$y = ax^b$	b												
	r^2												

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR MENINDEE LAKES EVAPORATION													
Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	2248.0000	1081.0000	1231.0000	1040.0000	571.6000	54.8600	387.9000	370.5000	750.6000	1195.0000	982.0000	1036.0000
$y = a + bx$	b	-1.0390	-0.4573	-0.5492	-0.4831	-0.2661	-0.0123	-0.1801	-0.1599	-0.3369	-0.5418	-0.4098	-0.4179
	r^2	0.2050	0.0638	0.1308	0.1256	0.0528	0.0002	0.0549	0.0311	0.0853	0.1249	0.0504	0.0496
		Signif	Signif	Signif	Signif	Signif		Signif		Signif	Signif	Signif	Signif
Exponential	a			12.6100					10.8200	13.5000	14.5800	9.9300	9.5530
$y = ae^{bx}$	b			-0.0039					-0.0035	-0.0046	-0.0050	-0.0024	-0.0022
	r^2			0.0965					0.0327	0.0619	0.1204	0.0349	0.0393
Power	a			62.1300					55.3100	72.4700	77.8500	41.0700	36.8300
$y = ax^b$	b			-7.5390					-6.7800	-8.9810	-9.6350	-4.7410	-4.1540
	r^2			0.0963					0.0322	0.0615	0.1197	0.0348	0.0390

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

DETRENDING DATA FOR LAKE VICTORIA EVAPORATION

Regression	Coefs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Linear	a	925.7000	560.8000	528.4000	538.2000	204.8000	-62.3700	125.3000	-73.9600	304.3000	550.2000	477.9000	441.5000
$y = a + bx$	b	-0.3700	-0.2040	-0.1993	-0.2388	-0.0892	0.0388	-0.0584	0.0509	-0.1281	-0.2371	-0.1767	-0.1313
	r^2	0.0734	0.0260	0.0396	0.0433	0.0126	0.0028	0.0100	0.0056	0.0268	0.0472	0.0207	0.0121
		Signif			Signif						Signif		
Exponential	a	9.2880										8.6130	7.0620
$y = ae^{bx}$	b	-0.0020										-0.0019	-0.0010
	r^2	0.0660										0.0276	0.0174
Power	a	35.3900										33.3200	19.2300
$y = ax^b$	b	-3.9730										-3.7590	-1.8510
	r^2	0.0662										0.0278	0.0175

Note:- When no coefficients are shown in the table, zero or negative values occur in the data and the regression is not defined

Appendix E

Box-Cox Transformation Parameters

The table overleaf provides an explaination of the terms used in the transformation parameter table. The full title of the data sets was not able to be placed in the table due to space limitations.

Abreviation	Full Title
MDSNWY	Net Snowy diversion to Hume catchment.
MDMRGT	Inflow to Murray Gates.
MDDART	Inflow to Dartmouth.
MDHUME	Natural inflow to Hume.
MDKIEW	Inflow to Murray from the Kiewa.
HUNREG	Unregulated inflows to Hume.
OVENMD	Total Ovens inflow.
MURRUM	Murrumbidgee inflow to Murray.
INFMEN	Inflow to Menindee Lakes.
MDBCGR	Inflows from Goulburn, Broken and Campaspe.
MDRNDN	Deniliquin rainfall.
MDRNKR	Kerang Post Office rainfall.
MDRNTC	Tocumwal rainfall

BOX-COX TRANSFORMATION PARAMETERS λ_{ij} and τ_{ij}

Site	Params.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MDSNWY	λ	-0.940	-0.910	-0.980	1.140	1.100	1.690	2.000	2.000	1.110	1.280	1.210	-0.980
	τ	222.617	215.763	97.405	71.744	116.608	25.141	188.746	106.328	107.647	196.977	132.342	160.281
MDMRGT	λ	-0.950	0.350	-0.990	-0.940	-0.120	-0.460	0.300	0.450	0.550	-1.100	0.440	-1.500
	τ	20.047	0.007	15.406	14.722	0.347	6.245	-5.918	60.250	59.491	229.734	6.169	57.428
MDDART	λ	0.240	0.000	-0.180	-0.140	-0.040	-0.130	0.240	0.390	-0.550	-0.980	0.270	-0.110
	τ	-2.882	1.033	3.301	-0.670	-3.424	-1.008	-10.759	-17.569	211.876	237.267	0.997	13.923
MDHUME	λ	0.150	0.270	-0.410	-0.260	-0.320	-0.210	0.270	0.440	0.510	-0.790	0.530	0.060
	τ	-8.204	-0.394	44.836	8.822	17.506	1.828	-63.424	614.064	-119.399	815.936	-20.540	41.432
MDKIEW	λ	-0.320	-0.350	0.220	-0.810	-1.100	-0.020	0.170	0.370	0.510	-0.550	0.570	0.430
	τ	15.902	7.910	16.072	15.125	30.287	-4.756	-6.965	82.539	-23.511	89.609	-3.748	1.084
HUNREG	λ	0.020	0.200	-0.700	-0.340	-0.400	-0.130	0.250	0.320	0.440	-0.400	0.500	0.050
	τ	4.820	4.640	43.650	10.405	15.450	-9.916	-44.687	497.000	-52.651	243.136	-9.068	29.418
OVENMD	λ	0.150	-0.060	0.060	-0.380	-0.330	0.080	0.290	0.270	0.550	0.220	0.320	-0.190
	τ	1.042	1.322	1.040	7.769	5.439	-2.790	-10.853	421.070	-14.190	312.152	-0.852	10.773
MURRUM	λ	-1.500	-0.180	-1.500	-1.500	-0.770	-0.530	-0.170	-0.120	0.020	0.000	-0.070	-0.430
	τ	123.277	80.574	82.175	39.613	-2.985	-2.990	-2.952	-2.975	-2.946	66.185	41.138	41.627
INFMEN	λ	0.070	0.140	0.130	-0.870	0.020	-0.060	0.000	0.020	0.060	0.020	-0.050	-0.020
	τ	1.144	1.097	1.093	910.382	1.125	1.066	1.127	1.070	1.091	1.070	1.039	1.036
MDBCGR	λ	-0.060	-0.990	-0.140	-0.910	-0.390	-0.120	0.060	0.150	0.160	-0.030	-0.220	-0.140
	τ	-10.762	15.505	-10.967	13.918	21.790	-12.949	-13.922	-12.797	-12.816	-10.970	-9.924	-10.959
MDRNDN	λ	-0.200	0.220	0.260	0.420	0.400	0.460	0.390	0.510	0.370	0.390	0.240	0.190
	τ	53.709	1.108	1.137	1.056	1.177	32.101	0.070	-0.987	-2.792	1.114	1.117	1.145
MDRNKR	λ	-0.130	0.170	0.250	0.360	0.530	-0.630	0.500	0.540	0.500	0.380	0.330	0.170
	τ	35.097	1.058	1.060	1.080	1.094	85.739	-3.946	0.704	1.257	1.215	28.107	1.102
MDRNTC	λ	0.200	0.140	0.240	0.350	0.360	0.540	0.530	0.660	0.540	0.420	0.340	0.280
	τ	1.088	1.071	1.121	1.077	1.101	38.412	0.188	-0.814	-2.958	1.066	1.021	1.074

The values of λ_{ij} and τ_{ij} are the transformation parameters for use in equation 4.7 for site i in month j.

Appendix F

Historical Statistics

In this Appendix the abreviations used are defined below.

Abreviation	Full Title
Mean	Mean of the data.
St.Dev	Standard deviation of the data.
Cs.	Coefficient of skewness.
Ck.	Coefficient of kurtosis.
SC1	Lag 1 serial correlation coefficient.

Statistics for Historical Net Snowy Diversions					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	53.9	28.1	1.256	7.864	0.7908
February	64.0	22.2	1.172	7.654	0.5877
March	61.2	24.6	1.252	5.632	0.7390
April	53.6	28.5	-0.357	6.825	0.5766
May	106.0	35.1	-0.765	4.637	0.4293
June	92.7	38.6	-1.033	4.570	0.5956
July	89.9	36.3	-0.385	3.057	0.5617
August	76.4	36.8	-0.544	3.013	0.4674
September	-23.3	40.8	0.076	3.404	0.2800
October	-45.0	51.4	-0.263	2.701	0.5256
Novenber	9.2	40.5	-0.321	4.018	0.6744
December	39.3	27.1	2.244	15.001	0.5843
Annual	577.9	221.0	0.273	2.834	-0.0992

Statistics for Historical Inflow to Murray Gates					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	17.3	11.5	1.820	7.480	0.5733
February	11.4	6.9	0.975	3.297	0.6648
March	12.5	8.4	1.894	7.552	0.5560
April	15.1	14.9	5.367	40.949	0.7177
May	22.5	15.6	2.313	10.508	0.7295
June	34.3	28.5	2.765	11.673	0.6794
July	48.2	32.4	1.091	3.482	0.6697
August	60.0	35.5	1.066	3.868	0.6780
September	70.1	32.4	0.831	3.238	0.7256
October	73.4	39.6	1.737	7.641	0.7510
Novenber	45.3	23.2	0.728	3.234	0.6590
December	27.0	16.0	1.861	8.293	0.7495
Annual	436.9	191.3	1.217	4.954	0.1615

Statistics for Historical Inflow to Dartmouth					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	30.0	21.2	1.268	4.048	0.6215
February	20.7	15.3	1.495	4.648	0.6214
March	22.2	18.4	2.615	12.448	0.6262
April	29.3	36.8	5.809	44.734	0.5166
May	45.5	41.4	2.739	12.382	0.6646
June	78.9	77.4	2.692	10.522	0.6772
July	110.8	84.5	1.394	4.538	0.6126
August	138.2	87.8	1.168	4.346	0.5494
September	155.7	77.1	1.205	6.234	0.5429
October	156.2	92.9	2.477	14.500	0.7332
Novenber	91.8	58.8	1.210	3.977	0.6554
December	50.0	32.3	1.568	5.813	0.7053
Annual	929.3	456.5	1.391	6.200	0.1046

Statistics for Historical Inflow to Hume					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	141.7	99.5	2.177	10.875	0.6096
February	90.5	56.0	1.026	3.237	0.6996
March	96.6	66.6	1.930	7.724	0.5702
April	126.2	134.4	5.831	45.821	0.6600
May	198.2	163.5	2.891	14.256	0.7341
June	334.0	313.3	2.780	11.331	0.6827
July	484.8	367.3	1.333	4.255	0.6402
August	602.8	397.7	1.106	3.858	0.6904
September	691.7	350.5	0.929	3.923	0.7005
October	718.3	424.6	1.786	8.130	0.7574
Novenber	424.7	249.6	0.702	2.613	0.7420
December	232.8	143.0	1.474	5.879	0.7718
Annual	4142.4	2050.0	1.258	5.089	0.1264

Statistics for Historical Kiewa River Data					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	18.9	14.0	1.597	6.419	0.5976
February	12.8	10.7	1.916	7.355	0.6272
March	14.6	13.0	1.802	6.253	0.4982
April	20.7	26.2	6.130	48.634	0.4312
May	34.3	34.0	3.956	21.778	0.6746
June	52.0	41.5	2.385	9.443	0.6317
July	69.4	47.2	1.748	6.539	0.6969
August	82.1	50.9	1.119	3.888	0.7086
September	100.2	48.8	0.977	4.109	0.7001
October	104.4	57.1	1.437	6.155	0.7753
Novenber	63.7	36.2	0.634	2.603	0.7681
December	31.5	19.5	0.949	3.501	0.7405
Annual	604.5	291.7	1.447	6.249	0.2074

Statistics for Historical Unregulated Hume Inflow					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	88.6	69.9	2.844	16.198	0.6047
February	55.8	36.2	1.062	3.374	0.7422
March	57.7	41.4	2.089	8.714	0.5586
April	73.6	82.0	6.243	50.468	0.7149
May	116.7	103.6	3.399	18.330	0.7742
June	208.0	210.6	2.963	12.544	0.6875
July	319.7	261.7	1.487	4.941	0.6523
August	399.1	289.7	1.293	4.660	0.7342
September	426.3	247.2	1.098	4.180	0.7323
October	433.1	291.3	1.966	8.314	0.7545
Novenber	261.8	163.7	0.782	2.720	0.7373
December	144.5	97.4	1.624	6.622	0.7829
Annual	2584.9	1421.2	1.361	5.246	0.1483

Statistics for Historical Ovens River Data					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	27.3	25.5	1.832	6.739	0.7098
February	16.2	22.3	4.259	25.901	0.4497
March	18.9	21.6	2.919	13.245	0.6969
April	34.6	71.0	6.064	43.330	0.4712
May	67.4	112.1	3.520	16.629	0.5124
June	143.6	163.6	2.230	8.749	0.5618
July	249.5	219.5	1.713	6.080	0.6297
August	318.6	236.0	1.322	4.909	0.7010
September	283.2	175.3	0.765	3.261	0.6472
October	227.3	176.6	1.303	4.402	0.7148
Novenber	122.3	101.1	1.392	4.337	0.7440
December	63.7	68.7	2.382	8.537	0.7040
Annual	1572.8	995.8	1.296	4.858	0.1446

Statistics for Historical Murrumbidgee River Data					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	42.3	81.3	7.257	61.740	0.2337
February	28.7	25.2	1.511	6.662	0.6965
March	46.0	144.0	8.601	77.518	0.2479
April	60.7	190.9	4.759	25.454	0.7948
May	64.9	212.3	5.800	39.252	0.6532
June	164.8	420.6	3.937	18.585	0.6536
July	250.1	464.4	3.511	18.481	0.6765
August	258.2	365.7	1.497	4.359	0.5690
September	240.9	344.2	1.969	7.046	0.6866
October	230.4	402.6	2.274	8.176	0.7346
Novenber	103.4	175.6	1.746	4.737	0.7688
December	44.8	73.7	2.931	11.268	0.7729
Annual	1535.3	2141.7	2.597	11.462	0.1546

Statistics for Historical Menindee Lakes Inflow					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	156.3	324.9	5.046	34.479	0.8322
February	154.7	273.0	4.654	32.097	0.4309
March	232.5	425.0	3.584	17.342	0.7684
April	280.1	647.4	5.216	33.819	0.7427
May	212.3	497.5	5.166	35.315	0.7322
June	133.6	398.4	6.322	48.265	0.8436
July	191.4	452.3	4.641	27.834	0.8807
August	270.1	559.2	4.073	22.818	0.8908
September	283.4	631.3	3.766	17.752	0.8023
October	222.2	463.0	3.208	12.934	0.7610
Novenber	167.3	327.0	3.486	17.025	0.5562
December	159.1	292.8	3.383	18.097	0.5736
Annual	2463.0	3735.6	3.597	18.892	0.1813

Statistics for Historical Inflows from Goulburn, Broken and Campaspe Rivers					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	24.1	17.2	3.050	13.238	0.5147
February	18.6	13.7	3.739	17.663	0.5425
March	21.2	16.8	3.771	17.735	0.6699
April	25.6	36.3	5.697	38.274	0.6434
May	46.5	101.2	6.353	47.459	0.8593
June	98.4	198.7	4.320	23.911	0.8521
July	195.2	295.6	2.684	10.463	0.9103
August	282.7	364.0	1.983	6.669	0.8533
September	273.8	342.6	1.968	7.489	0.8459
October	213.6	315.5	1.889	5.535	0.7782
Novenber	109.2	174.9	2.371	7.877	0.6197
December	49.7	88.6	4.630	25.703	0.6886
Annual	1358.6	1532.6	2.362	9.971	0.2599

Statistics for Historical Loddon River Data					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	0.6	2.7	5.099	27.881	0.0943
February	0.6	2.9	7.603	63.458	0.5577
March	0.4	1.3	5.561	37.020	0.5245
April	0.1	0.3	3.399	14.289	0.1080
May	2.1	6.8	4.616	24.708	0.1348
June	8.1	21.4	4.034	19.848	0.8251
July	18.4	34.9	2.928	12.123	0.8640
August	29.1	47.1	2.835	14.040	0.6849
September	29.4	46.3	1.914	6.025	0.5774
October	17.5	36.8	3.006	12.197	0.7171
Novenber	6.4	17.0	3.570	15.643	0.5934
December	4.6	30.0	9.134	84.812	0.2053
Annual	117.2	157.6	1.566	4.775	0.2444

Statistics for Historical Deniliquin Rainfall					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	29.1	38.8	2.882	14.470	0.0522
February	26.2	29.0	1.560	4.922	-0.0080
March	30.6	32.4	1.722	6.478	0.2114
April	28.0	24.3	0.944	3.326	0.1066
May	38.8	30.0	0.892	2.986	0.0926
June	41.7	25.4	0.863	3.421	0.1539
July	36.1	23.9	1.092	4.028	0.1976
August	37.5	22.8	0.990	4.569	0.1278
September	35.4	23.4	1.122	3.815	0.2330
October	40.0	29.1	1.077	3.513	0.2432
Novenber	27.2	25.6	1.776	6.510	0.1111
December	30.2	32.2	2.007	7.237	0.1620
Annual	400.9	130.5	0.705	3.906	0.0641

Statistics for Historical Kerang Rainfall					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	22.5	27.1	2.325	9.240	0.1070
February	24.8	30.9	2.129	7.997	-0.0156
March	29.1	30.3	1.456	4.948	0.1821
April	24.2	21.0	1.053	3.851	0.0965
May	36.1	26.1	0.913	4.196	0.0577
June	36.8	22.0	0.955	4.308	0.2055
July	35.0	20.4	1.060	4.554	0.2438
August	37.0	21.0	0.808	3.665	0.2243
September	34.9	21.6	0.657	2.759	0.1736
October	39.0	29.8	1.219	4.437	0.2575
Novenber	25.8	19.6	1.083	4.414	0.0646
December	24.8	27.7	2.307	9.543	0.0080
Annual	370.0	112.1	0.636	4.284	0.0498

Statistics for Historical Tocumwal Rainfall					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	33.2	39.8	2.359	10.221	-0.0618
February	27.0	35.9	2.414	9.248	0.0893
March	36.1	38.3	1.761	6.551	0.2736
April	32.7	28.9	1.205	4.124	0.1544
May	41.1	33.1	1.319	4.772	0.0712
June	46.3	27.2	0.616	2.923	0.1345
July	41.4	23.6	0.626	2.710	0.1883
August	44.1	24.9	0.556	3.102	0.1785
September	38.0	22.0	0.874	3.565	0.1866
October	45.7	33.7	1.146	4.289	0.2636
Novenber	31.0	28.0	1.440	5.297	0.1215
December	32.4	33.1	1.556	5.246	0.0844
Annual	448.9	142.3	0.619	3.648	0.0715

Statistics for Historical Hume Evaporation Data					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	142.8	57.7	-0.808	3.761	0.2922
February	105.3	57.2	-0.627	3.726	0.4100
March	74.9	52.2	-0.663	2.933	0.3996
April	27.5	46.3	-0.959	4.151	0.2369
May	-23.8	41.4	-0.688	2.835	0.1675
June	-52.0	41.7	-0.454	2.925	0.2475
July	-54.0	40.5	-0.615	2.524	0.2010
August	-43.8	36.5	-0.111	2.898	0.2370
September	-13.1	32.6	-0.367	2.604	0.1705
October	15.0	49.4	-0.623	3.293	0.2706
Novenber	73.4	50.4	-0.370	3.159	0.2807
December	117.0	59.3	-0.827	4.420	0.2809
Annual	369.0	251.6	0.102	3.263	0.1965

Statistics for Historical Menindee Lakes Evaporation					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	233.7	63.3	-1.531	6.224	0.4317
February	194.8	49.9	-1.661	6.708	0.3978
March	166.3	41.9	-0.938	3.916	0.3442
April	103.6	37.6	-2.048	11.036	0.3852
May	56.0	31.9	-0.456	3.130	0.4795
June	31.1	25.0	-0.582	3.693	0.3251
July	38.9	21.2	-0.308	2.646	0.3707
August	60.5	25.0	0.075	2.788	0.4938
September	97.7	31.8	-0.760	3.160	0.4180
October	145.4	42.3	-0.626	3.219	0.5076
Novenber	187.8	50.3	-0.897	3.720	0.4044
December	226.1	51.8	-0.931	4.172	0.3925
Annual	1541.9	278.8	-0.821	4.410	0.8220

Statistics for Historical Lake Victoria Evaporation					
Month	Mean	Stdev.	Cs.	Ck.	SC1
January	208.5	37.7	-1.243	5.004	0.3979
February	165.5	34.8	-1.911	8.879	0.0222
March	142.2	27.6	-2.325	11.284	0.5156
April	75.3	31.6	-2.726	14.785	0.2538
May	31.9	21.9	-0.896	3.507	0.3566
June	12.8	20.1	-0.839	3.609	0.2826
July	12.2	16.1	-0.457	4.555	0.2854
August	24.8	18.7	0.360	3.364	0.4585
September	56.0	21.6	-1.224	5.310	0.4513
October	90.7	30.1	-0.812	3.560	0.3630
Novenber	135.4	33.9	-0.708	3.559	0.3515
December	187.1	33.0	-0.841	3.420	0.1923
Annual	1142.4	158.2	-0.448	3.340	0.9323

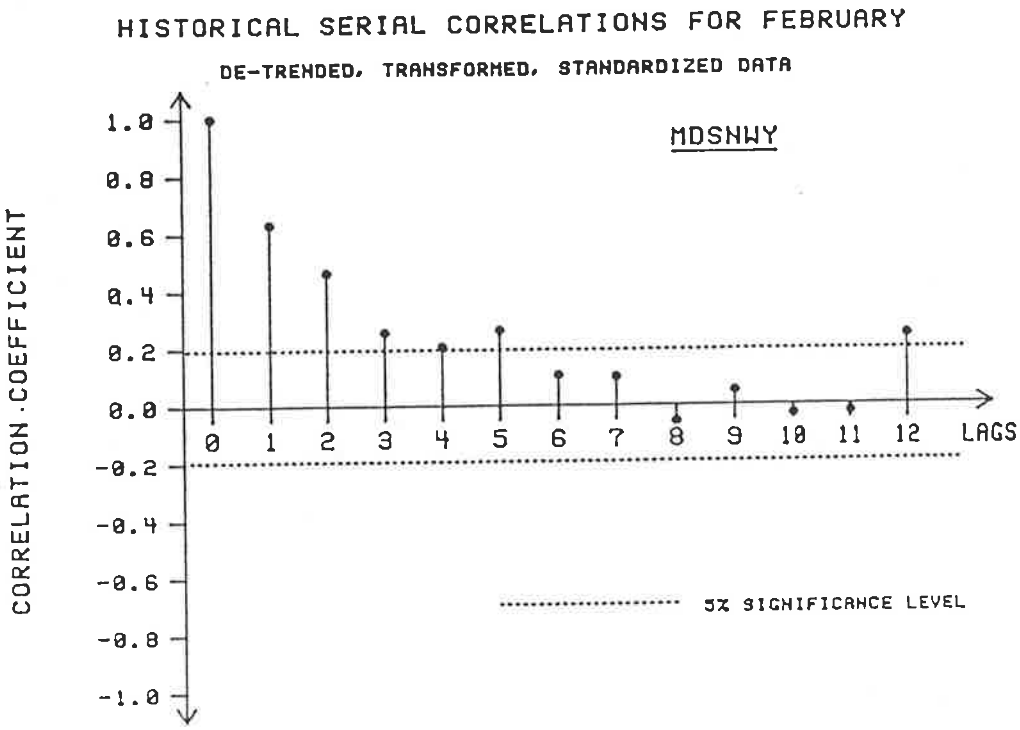
Appendix G

Correlation Coefficients and Correlograms

In this Appendix the abreviations used are defined below.

It has been necessary to use a numeric abreviation to allow the tables to fit entirely on one page.

Abreviation	Full Title
1	Net Snowy diversion to Hume catchment.
2	Inflow to Murray Gates.
3	Inflow to Dartmouth.
4	Natural inflow to Hume.
5	Inflow to Murray from the Kiewa.
6	Unregulated inflows to Hume.
7	Total Ovens inflow.
8	Murrumbidgee inflow to Murray.
9	Inflow to Menindee Lakes.
10	Inflows from Goulburn, Broken and Campaspe.
11	Deniliquin rainfall.
12	Kerang Post Office rainfall.
13	Tocumwal rainfall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DE-TRENDED, TRANSFORMED, STANDARDIZED DATA
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0.2
0.0
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-0.4
-0.6
-0.8
-1.0
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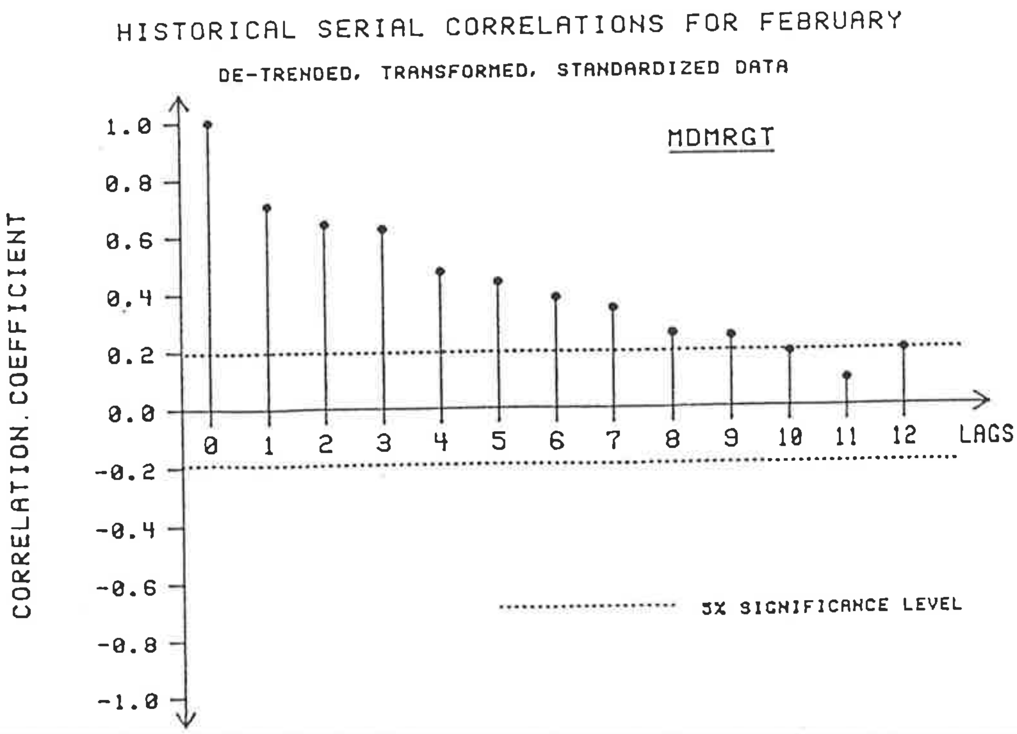
5% SIGNIFICANCE LEVEL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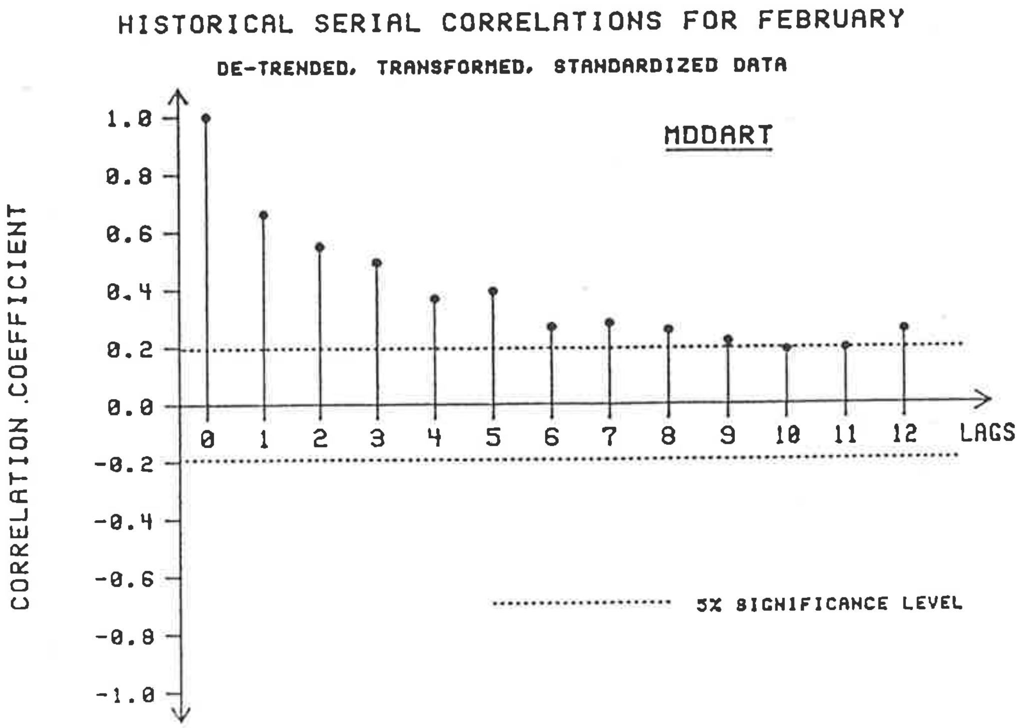
0 1 2 3 4 5 6 7 8 9 10 11 12 LAGS
5% SIGNIFICANCE LEVEL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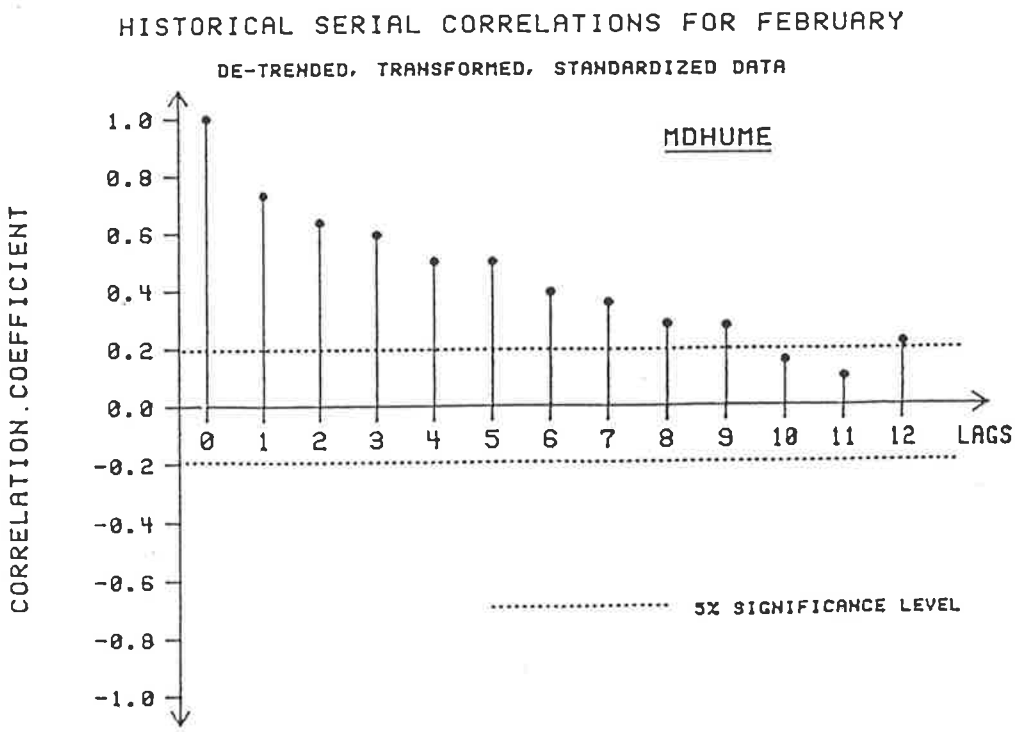
0 1 2 3 4 5 6 7 8 9 10 11 12 LAGS
5% SIGNIFICANCE LEVEL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CORRELATION.COEFFICIENT
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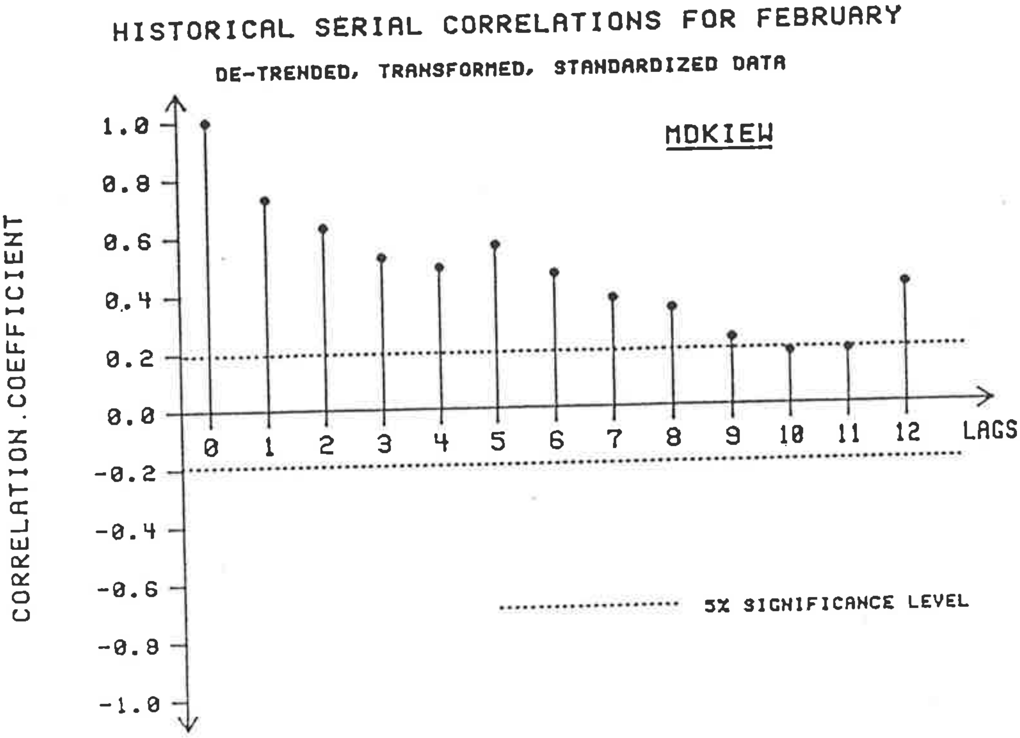
0 1 2 3 4 5 6 7 8 9 10 11 12 LAGS
5% SIGNIFICANCE LEVEL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MDKIEW
CORRELATION.COEFFICIENT
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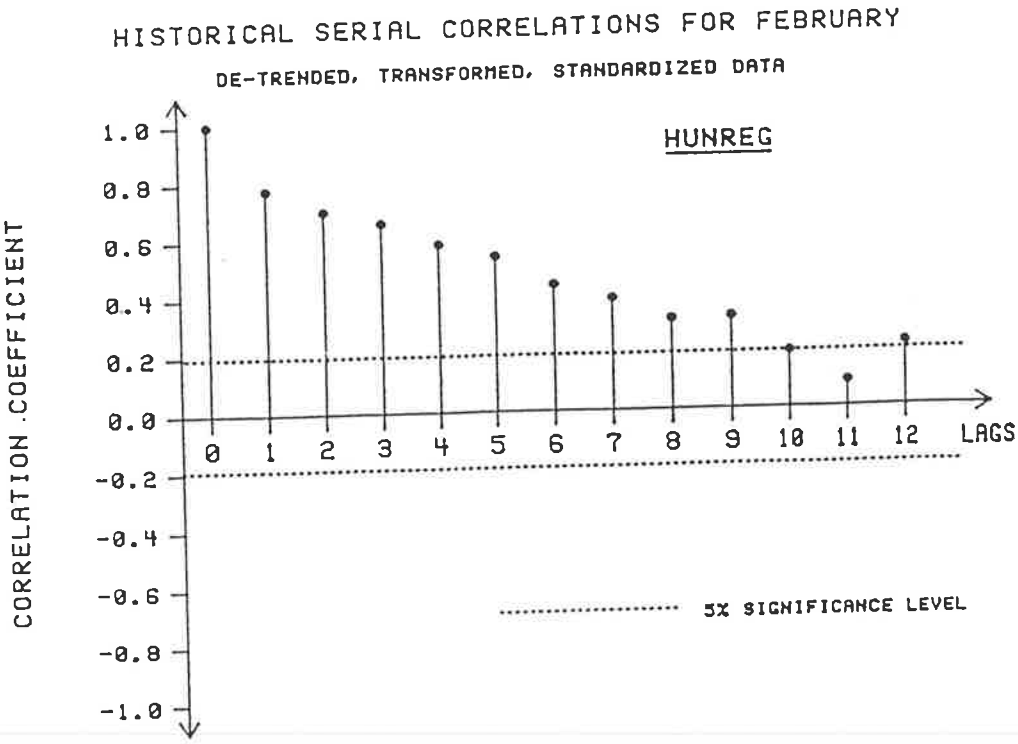
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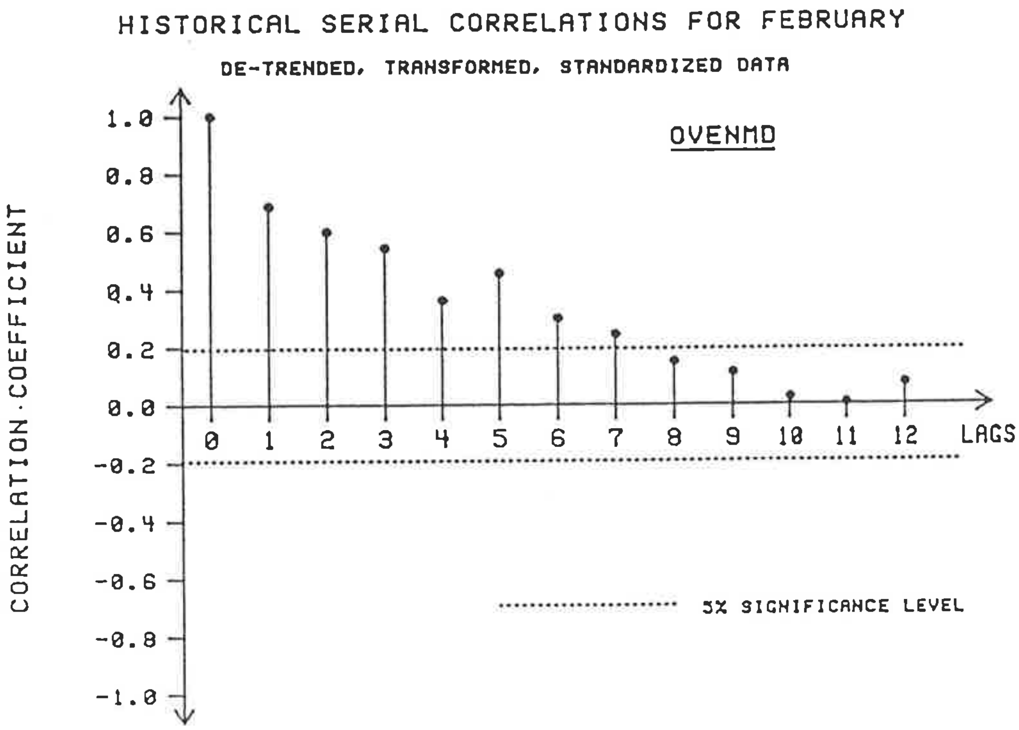
5% SIGNIFICANCE LEVEL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CORRELATION COEFFICIENT
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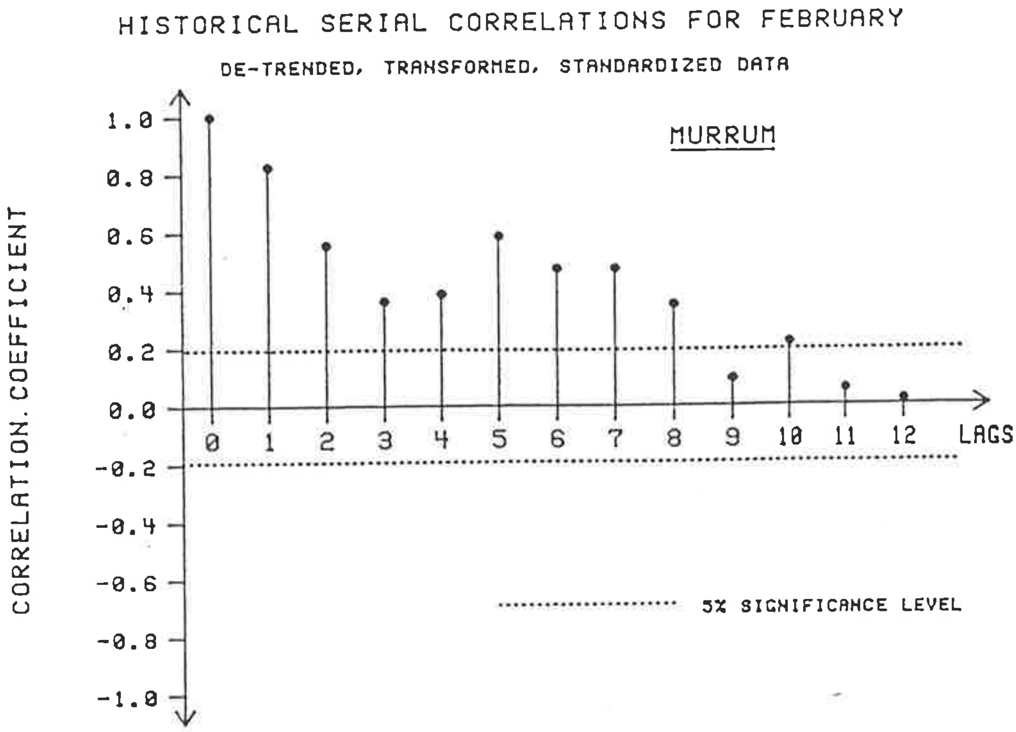
5% SIGNIFICANCE LEVEL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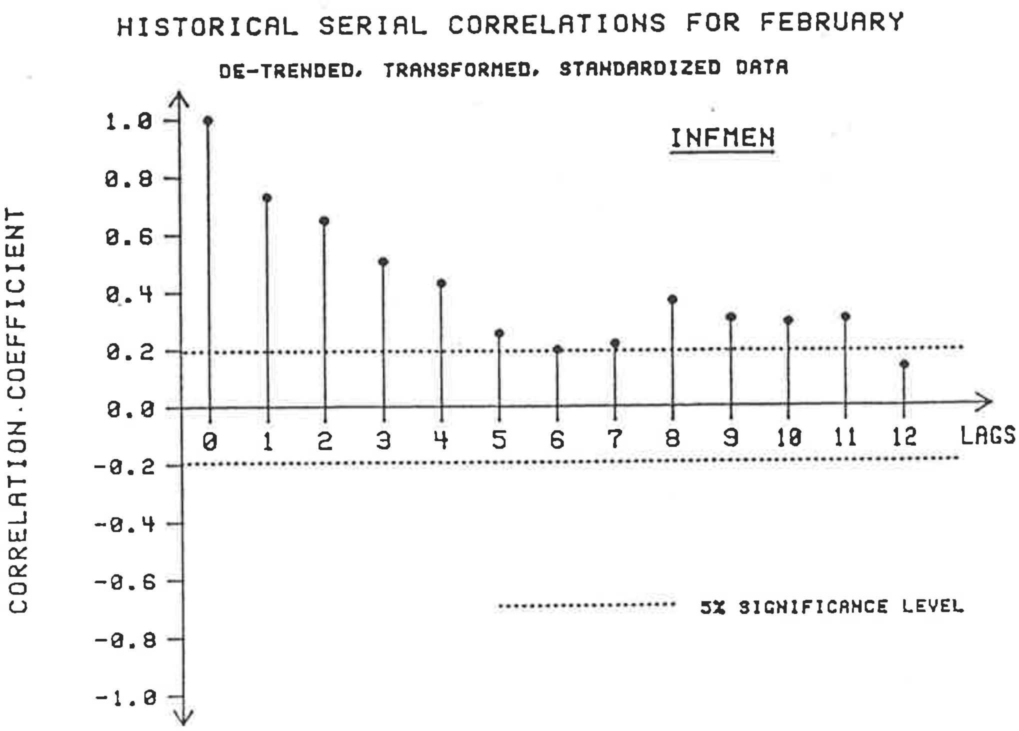
5% SIGNIFICANCE LEVEL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DE-TRENDED, TRANSFORMED, STANDARDIZED DATA
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CORRELATION.COEFFICIENT
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0.4
0.2
0.0
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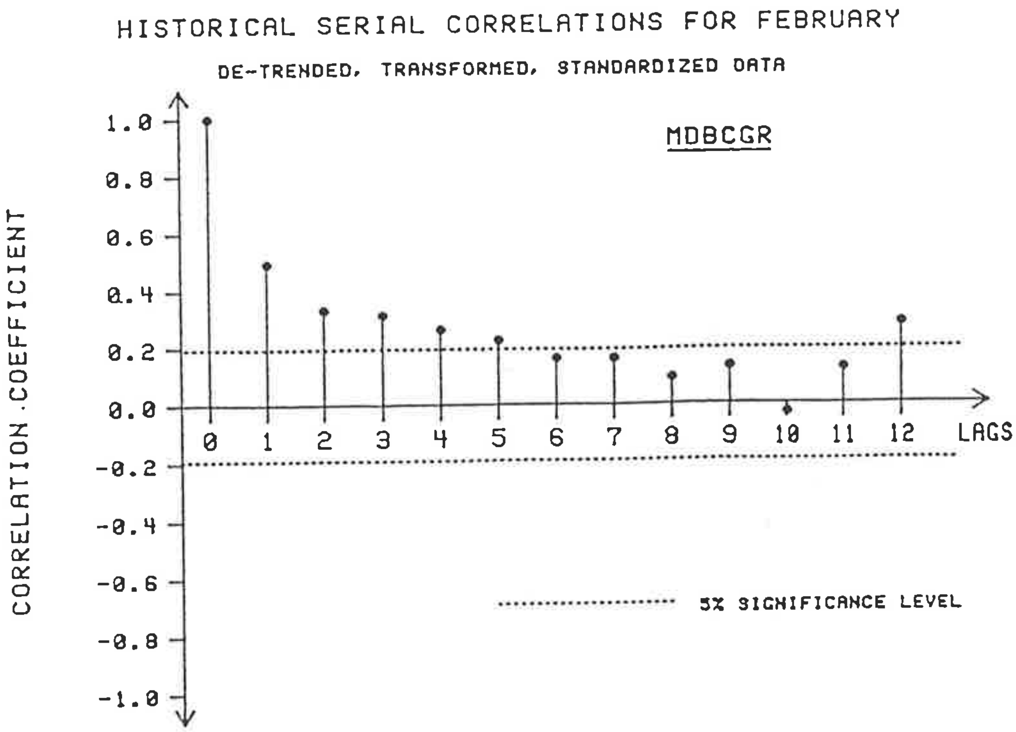
0 1 2 3 4 5 6 7 8 9 10 11 12 LAGS
5% SIGNIFICANCE LEVEL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0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
0 1 2 3 4 5 6 7 8 9 10 11 12 LAGS
5% SIGNIFICANCE LEVEL

ANNUAL LAG 0 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.418	-0.418	-0.439	-0.420	-0.417	-0.434	-0.081	-0.034	-0.294	-0.335	-0.318	-0.321
Synthetic	1.000	-0.489	-0.491	-0.491	-0.503	-0.472	-0.477	-0.096	-0.100	-0.360	-0.378	-0.356	-0.352
2: Historical	-0.418	1.000	0.939	0.977	0.921	0.974	0.917	0.755	0.467	0.860	0.786	0.718	0.756
Synthetic	-0.489	1.000	0.939	0.962	0.901	0.956	0.906	0.580	0.397	0.747	0.695	0.665	0.664
3: Historical	-0.418	0.939	1.000	0.958	0.916	0.937	0.919	0.707	0.447	0.878	0.795	0.694	0.753
Synthetic	-0.491	0.939	1.000	0.963	0.912	0.948	0.917	0.577	0.403	0.789	0.711	0.676	0.690
4: Historical	-0.439	0.977	0.958	1.000	0.944	0.986	0.944	0.738	0.445	0.880	0.789	0.718	0.766
Synthetic	-0.491	0.962	0.963	1.000	0.935	0.983	0.930	0.595	0.393	0.795	0.703	0.678	0.688
5: Historical	-0.420	0.921	0.916	0.944	1.000	0.940	0.933	0.681	0.455	0.887	0.772	0.743	0.761
Synthetic	-0.503	0.901	0.912	0.935	1.000	0.930	0.924	0.525	0.387	0.795	0.704	0.699	0.694
6: Historical	-0.417	0.974	0.937	0.986	0.940	1.000	0.941	0.746	0.443	0.875	0.777	0.714	0.762
Synthetic	-0.472	0.956	0.948	0.983	0.930	1.000	0.930	0.605	0.384	0.798	0.687	0.667	0.676
7: Historical	-0.434	0.917	0.919	0.944	0.933	0.941	1.000	0.623	0.381	0.889	0.784	0.743	0.771
Synthetic	-0.477	0.906	0.917	0.930	0.924	0.930	1.000	0.512	0.363	0.826	0.697	0.682	0.685
8: Historical	-0.081	0.755	0.707	0.738	0.681	0.746	0.623	1.000	0.677	0.706	0.602	0.528	0.602
Synthetic	-0.096	0.580	0.577	0.595	0.525	0.605	0.512	1.000	0.388	0.550	0.455	0.418	0.432
9: Historical	-0.034	0.467	0.447	0.445	0.455	0.443	0.381	0.677	1.000	0.501	0.392	0.423	0.378
Synthetic	-0.100	0.397	0.403	0.393	0.387	0.384	0.363	0.388	1.000	0.398	0.400	0.355	0.380
10: Historical	-0.294	0.860	0.878	0.880	0.887	0.875	0.889	0.706	0.501	1.000	0.687	0.638	0.660
Synthetic	-0.360	0.747	0.789	0.795	0.795	0.798	0.826	0.550	0.398	1.000	0.613	0.595	0.576
11: Historical	-0.335	0.786	0.795	0.789	0.772	0.777	0.784	0.602	0.392	0.687	1.000	0.861	0.921
Synthetic	-0.378	0.695	0.711	0.703	0.704	0.687	0.697	0.455	0.400	0.613	1.000	0.836	0.884
12: Historical	-0.318	0.718	0.694	0.718	0.743	0.714	0.743	0.528	0.423	0.638	0.861	1.000	0.831
Synthetic	-0.356	0.665	0.676	0.678	0.699	0.667	0.682	0.418	0.355	0.595	0.836	1.000	0.800
13: Historical	-0.321	0.756	0.753	0.766	0.761	0.762	0.771	0.602	0.378	0.660	0.921	0.831	1.000
Synthetic	-0.352	0.664	0.690	0.688	0.694	0.676	0.685	0.432	0.380	0.576	0.884	0.800	1.000

ANNUAL LAG 0 CORRELATION COEFFICIENTS (generation using lag 12 terms)	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.418	-0.418	-0.439	-0.420	-0.417	-0.434	-0.081	-0.034	-0.294	-0.335	-0.318	-0.321
Synthetic	1.000	-0.397	-0.412	-0.408	-0.425	-0.389	-0.401	-0.026	-0.026	-0.301	-0.323	-0.306	-0.317
2: Historical	-0.418	1.000	0.939	0.977	0.921	0.974	0.917	0.755	0.467	0.860	0.786	0.718	0.756
Synthetic	-0.397	1.000	0.936	0.962	0.899	0.957	0.900	0.571	0.399	0.745	0.680	0.654	0.663
3: Historical	-0.418	0.939	1.000	0.958	0.916	0.937	0.919	0.707	0.447	0.878	0.795	0.694	0.753
Synthetic	-0.412	0.936	1.000	0.962	0.913	0.946	0.911	0.564	0.407	0.790	0.702	0.663	0.692
4: Historical	-0.439	0.977	0.958	1.000	0.944	0.986	0.944	0.738	0.445	0.880	0.789	0.718	0.766
Synthetic	-0.408	0.962	0.962	1.000	0.934	0.983	0.925	0.584	0.401	0.794	0.694	0.670	0.690
5: Historical	-0.420	0.921	0.916	0.944	1.000	0.940	0.933	0.681	0.455	0.887	0.772	0.743	0.761
Synthetic	-0.425	0.899	0.913	0.934	1.000	0.928	0.918	0.505	0.384	0.783	0.689	0.681	0.691
6: Historical	-0.417	0.974	0.937	0.986	0.940	1.000	0.941	0.746	0.443	0.875	0.777	0.714	0.762
Synthetic	-0.389	0.957	0.946	0.983	0.928	1.000	0.926	0.595	0.397	0.798	0.680	0.663	0.679
7: Historical	-0.434	0.917	0.919	0.944	0.933	0.941	1.000	0.623	0.381	0.889	0.784	0.743	0.771
Synthetic	-0.401	0.900	0.911	0.925	0.918	0.926	1.000	0.501	0.369	0.825	0.693	0.678	0.695
8: Historical	-0.081	0.755	0.707	0.738	0.681	0.746	0.623	1.000	0.677	0.706	0.602	0.528	0.602
Synthetic	-0.026	0.571	0.564	0.584	0.505	0.595	0.501	1.000	0.418	0.526	0.430	0.408	0.409
9: Historical	-0.034	0.467	0.447	0.445	0.455	0.443	0.381	0.677	1.000	0.501	0.392	0.423	0.378
Synthetic	-0.026	0.399	0.407	0.401	0.384	0.397	0.369	0.418	1.000	0.393	0.398	0.357	0.396
10: Historical	-0.294	0.860	0.878	0.880	0.887	0.875	0.889	0.706	0.501	1.000	0.687	0.638	0.660
Synthetic	-0.301	0.745	0.790	0.794	0.783	0.798	0.825	0.526	0.393	1.000	0.613	0.591	0.584
11: Historical	-0.335	0.786	0.795	0.789	0.772	0.777	0.784	0.602	0.392	0.687	1.000	0.861	0.921
Synthetic	-0.323	0.680	0.702	0.694	0.689	0.680	0.693	0.430	0.398	0.613	1.000	0.832	0.879
12: Historical	-0.318	0.718	0.694	0.718	0.743	0.714	0.743	0.528	0.423	0.638	0.861	1.000	0.831
Synthetic	-0.306	0.654	0.663	0.670	0.681	0.663	0.678	0.408	0.357	0.591	0.832	1.000	0.787
13: Historical	-0.321	0.756	0.753	0.766	0.761	0.762	0.771	0.602	0.378	0.660	0.921	0.831	1.000
Synthetic	-0.317	0.663	0.692	0.690	0.691	0.679	0.695	0.409	0.396	0.584	0.879	0.787	1.000

ANNUAL LAG 1 CORRELATION COEFFICIENTS

(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	-0.099	0.519	0.474	0.503	0.441	0.506	0.420	0.531	0.326	0.479	0.300	0.273	0.262
Synthetic	-0.009	0.276	0.422	0.401	0.311	0.302	0.409	0.311	0.042	0.270	0.101	0.199	0.202
2: Historical	-0.118	0.161	0.146	0.164	0.214	0.164	0.210	0.102	0.129	0.179	0.225	0.224	0.259
Synthetic	-0.064	0.112	0.099	0.103	0.094	0.102	0.094	0.055	0.065	0.066	0.098	0.104	0.085
3: Historical	-0.087	0.077	0.104	0.097	0.141	0.092	0.142	0.057	0.091	0.137	0.146	0.132	0.183
Synthetic	-0.065	0.071	0.081	0.076	0.068	0.075	0.063	0.044	0.052	0.051	0.068	0.073	0.068
4: Historical	-0.096	0.116	0.114	0.126	0.176	0.126	0.176	0.079	0.107	0.148	0.188	0.189	0.243
Synthetic	-0.064	0.086	0.088	0.088	0.079	0.087	0.075	0.050	0.056	0.059	0.080	0.084	0.077
5: Historical	-0.085	0.117	0.124	0.130	0.207	0.129	0.185	0.074	0.086	0.151	0.195	0.198	0.248
Synthetic	-0.062	0.072	0.075	0.073	0.067	0.072	0.063	0.038	0.043	0.049	0.069	0.075	0.063
6: Historical	-0.104	0.138	0.125	0.146	0.197	0.148	0.199	0.087	0.109	0.161	0.208	0.216	0.269
Synthetic	-0.060	0.088	0.088	0.089	0.080	0.088	0.077	0.050	0.055	0.059	0.080	0.083	0.075
7: Historical	-0.036	0.083	0.090	0.091	0.156	0.090	0.144	0.054	0.047	0.119	0.160	0.148	0.215
Synthetic	-0.048	0.073	0.065	0.066	0.059	0.066	0.062	0.030	0.044	0.038	0.059	0.065	0.051
8: Historical	-0.192	0.235	0.228	0.242	0.273	0.244	0.310	0.154	0.214	0.294	0.256	0.270	0.294
Synthetic	-0.042	0.092	0.093	0.095	0.085	0.094	0.082	0.056	0.062	0.073	0.086	0.087	0.085
9: Historical	-0.116	0.089	0.089	0.105	0.123	0.116	0.173	0.067	0.181	0.159	0.082	0.067	0.100
Synthetic	-0.047	0.127	0.131	0.134	0.119	0.131	0.113	0.092	0.105	0.104	0.146	0.131	0.140
10: Historical	-0.126	0.201	0.220	0.214	0.258	0.208	0.271	0.138	0.119	0.259	0.226	0.188	0.276
Synthetic	-0.032	0.047	0.049	0.047	0.040	0.047	0.041	0.019	0.028	0.018	0.042	0.047	0.042
11: Historical	-0.073	-0.011	0.019	0.013	0.084	0.012	0.066	-0.031	0.004	0.080	0.064	0.087	0.085
Synthetic	-0.035	0.029	0.035	0.028	0.022	0.029	0.022	0.018	0.020	0.018	0.046	0.065	0.042
12: Historical	-0.091	-0.026	-0.026	-0.014	0.077	-0.009	0.046	-0.034	0.043	0.074	0.040	0.049	0.059
Synthetic	-0.027	0.035	0.037	0.034	0.025	0.034	0.028	0.012	0.008	0.019	0.047	0.066	0.046
13: Historical	-0.032	-0.043	-0.011	-0.016	0.066	-0.014	0.042	-0.048	0.029	0.073	0.045	0.071	0.071
Synthetic	-0.047	0.025	0.046	0.039	0.033	0.038	0.028	0.016	0.039	0.033	0.062	0.070	0.065

ANNUAL LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	-0.099	0.519	0.474	0.503	0.441	0.506	0.420	0.531	0.326	0.479	0.300	0.273	0.262
Synthetic	-0.025	0.359	0.354	0.368	0.327	0.361	0.322	0.228	0.073	0.268	0.236	0.217	0.231
2: Historical	-0.118	0.161	0.146	0.164	0.214	0.164	0.210	0.102	0.129	0.179	0.225	0.224	0.259
Synthetic	-0.031	0.078	0.065	0.076	0.105	0.074	0.066	0.059	0.178	0.080	0.095	0.122	0.089
3: Historical	-0.087	0.077	0.104	0.097	0.141	0.092	0.142	0.057	0.091	0.137	0.146	0.132	0.183
Synthetic	-0.017	0.038	0.056	0.057	0.078	0.055	0.038	0.078	0.176	0.080	0.076	0.102	0.079
4: Historical	-0.096	0.116	0.114	0.126	0.176	0.126	0.176	0.079	0.107	0.148	0.188	0.189	0.243
Synthetic	-0.019	0.034	0.042	0.049	0.076	0.048	0.034	0.063	0.171	0.067	0.071	0.101	0.079
5: Historical	-0.085	0.117	0.124	0.130	0.207	0.129	0.185	0.074	0.086	0.151	0.195	0.198	0.248
Synthetic	-0.018	0.034	0.046	0.052	0.095	0.051	0.037	0.071	0.180	0.072	0.072	0.112	0.082
6: Historical	-0.104	0.138	0.125	0.146	0.197	0.148	0.199	0.087	0.109	0.161	0.208	0.216	0.269
Synthetic	-0.019	0.038	0.042	0.051	0.079	0.051	0.038	0.057	0.166	0.067	0.072	0.103	0.081
7: Historical	-0.036	0.083	0.090	0.091	0.156	0.090	0.144	0.054	0.047	0.119	0.160	0.148	0.215
Synthetic	0.003	-0.013	-0.014	-0.010	0.024	-0.010	-0.010	0.006	0.119	0.013	0.022	0.047	0.031
8: Historical	-0.192	0.235	0.228	0.242	0.273	0.244	0.310	0.154	0.214	0.294	0.256	0.270	0.294
Synthetic	-0.046	0.132	0.138	0.144	0.138	0.144	0.121	0.139	0.165	0.134	0.131	0.171	0.143
9: Historical	-0.116	0.089	0.089	0.105	0.123	0.116	0.173	0.067	0.181	0.159	0.082	0.067	0.100
Synthetic	-0.012	0.068	0.071	0.080	0.083	0.077	0.055	0.074	0.169	0.074	0.091	0.111	0.107
10: Historical	-0.126	0.201	0.220	0.214	0.258	0.208	0.271	0.138	0.119	0.259	0.226	0.188	0.276
Synthetic	-0.026	0.020	0.027	0.026	0.049	0.026	0.007	0.060	0.135	0.044	0.053	0.073	0.056
11: Historical	-0.073	-0.011	0.019	0.013	0.084	0.012	0.066	-0.031	0.004	0.080	0.064	0.087	0.085
Synthetic	0.006	-0.050	-0.042	-0.039	-0.009	-0.036	-0.056	0.014	0.031	-0.028	-0.024	0.015	0.007
12: Historical	-0.091	-0.026	-0.026	-0.014	0.077	-0.009	0.046	-0.034	0.043	0.074	0.040	0.049	0.059
Synthetic	0.036	-0.066	-0.066	-0.052	-0.021	-0.047	-0.063	0.020	0.056	-0.032	-0.026	0.011	0.008
13: Historical	-0.032	-0.043	-0.011	-0.016	0.066	-0.014	0.042	-0.048	0.029	0.073	0.045	0.071	0.071
Synthetic	0.025	-0.092	-0.060	-0.061	-0.029	-0.060	-0.071	-0.007	0.055	-0.027	-0.006	0.012	0.029

		1	2	3	4	5	6	7	8	9	10	11	12	13
JANUARY LAG 0 CORRELATION COEFFICIENTS (generation using no lag 12 terms)														
1:	Historical	1.000	-0.469	-0.356	-0.366	-0.358	-0.326	-0.281	-0.141	0.013	-0.173	-0.258	-0.190	-0.242
	Synthetic	1.000	-0.439	-0.339	-0.279	-0.346	-0.239	-0.283	-0.185	0.045	-0.129	-0.311	-0.235	-0.266
2:	Historical	-0.469	1.000	0.879	0.943	0.872	0.925	0.849	0.393	0.236	0.606	0.562	0.410	0.535
	Synthetic	-0.439	1.000	0.825	0.903	0.819	0.883	0.822	0.424	0.251	0.526	0.424	0.360	0.346
3:	Historical	-0.356	0.879	1.000	0.900	0.876	0.832	0.818	0.219	0.315	0.491	0.480	0.282	0.497
	Synthetic	-0.339	0.825	1.000	0.871	0.815	0.816	0.789	0.395	0.281	0.511	0.351	0.293	0.309
4:	Historical	-0.366	0.943	0.900	1.000	0.894	0.976	0.863	0.303	0.255	0.545	0.572	0.384	0.531
	Synthetic	-0.279	0.903	0.871	1.000	0.837	0.966	0.849	0.396	0.319	0.574	0.314	0.256	0.290
5:	Historical	-0.358	0.872	0.876	0.894	1.000	0.864	0.888	0.237	0.190	0.533	0.507	0.344	0.490
	Synthetic	-0.346	0.819	0.815	0.837	1.000	0.814	0.845	0.336	0.219	0.571	0.341	0.267	0.276
6:	Historical	-0.326	0.925	0.832	0.976	0.864	1.000	0.854	0.351	0.237	0.563	0.584	0.414	0.528
	Synthetic	-0.239	0.883	0.816	0.966	0.814	1.000	0.839	0.389	0.317	0.582	0.281	0.230	0.265
7:	Historical	-0.281	0.849	0.818	0.863	0.888	0.854	1.000	0.360	0.229	0.652	0.520	0.342	0.492
	Synthetic	-0.283	0.822	0.789	0.849	0.845	0.839	1.000	0.395	0.256	0.618	0.285	0.243	0.258
8:	Historical	-0.141	0.393	0.219	0.303	0.237	0.351	0.360	1.000	0.195	0.607	0.317	0.340	0.278
	Synthetic	-0.185	0.424	0.395	0.396	0.336	0.389	0.395	1.000	0.199	0.176	0.240	0.189	0.094
9:	Historical	0.013	0.236	0.315	0.255	0.190	0.237	0.229	0.195	1.000	0.125	0.235	0.125	0.210
	Synthetic	0.045	0.251	0.281	0.319	0.219	0.317	0.256	0.199	1.000	0.236	0.125	0.047	0.170
10:	Historical	-0.173	0.606	0.491	0.545	0.533	0.563	0.652	0.607	0.125	1.000	0.328	0.314	0.304
	Synthetic	-0.129	0.526	0.511	0.574	0.571	0.582	0.618	0.176	0.236	1.000	0.209	0.202	0.341
11:	Historical	-0.258	0.562	0.480	0.572	0.507	0.584	0.520	0.317	0.235	0.328	1.000	0.746	0.845
	Synthetic	-0.311	0.424	0.351	0.314	0.341	0.281	0.285	0.240	0.125	0.209	1.000	0.722	0.624
12:	Historical	-0.190	0.410	0.282	0.384	0.344	0.414	0.342	0.340	0.125	0.314	0.746	1.000	0.685
	Synthetic	-0.235	0.360	0.293	0.256	0.267	0.230	0.243	0.189	0.047	0.202	0.722	1.000	0.521
13:	Historical	-0.242	0.535	0.497	0.531	0.490	0.528	0.492	0.278	0.210	0.304	0.845	0.685	1.000
	Synthetic	-0.266	0.346	0.309	0.290	0.276	0.265	0.258	0.094	0.170	0.341	0.624	0.521	1.000

FEBRUARY LAG 0 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.154	-0.178	-0.154	-0.107	-0.119	-0.117	0.142	-0.133	0.001	-0.175	-0.011	-0.130
Synthetic	1.000	-0.123	-0.140	-0.109	-0.092	-0.086	-0.099	-0.007	-0.024	-0.075	-0.083	0.076	-0.053
2: Historical	-0.154	1.000	0.801	0.933	0.752	0.925	0.582	0.518	0.386	0.528	0.418	0.248	0.357
Synthetic	-0.123	1.000	0.825	0.931	0.749	0.927	0.677	0.442	0.376	0.460	0.375	0.299	0.447
3: Historical	-0.178	0.801	1.000	0.892	0.823	0.798	0.656	0.269	0.364	0.469	0.462	0.411	0.459
Synthetic	-0.140	0.825	1.000	0.895	0.703	0.826	0.663	0.339	0.346	0.512	0.417	0.382	0.509
4: Historical	-0.154	0.933	0.892	1.000	0.830	0.969	0.662	0.435	0.459	0.511	0.395	0.331	0.403
Synthetic	-0.109	0.931	0.895	1.000	0.767	0.961	0.693	0.395	0.394	0.490	0.382	0.339	0.480
5: Historical	-0.107	0.752	0.823	0.830	1.000	0.767	0.848	0.268	0.382	0.564	0.428	0.472	0.476
Synthetic	-0.092	0.749	0.703	0.767	1.000	0.763	0.684	0.320	0.299	0.485	0.320	0.285	0.399
6: Historical	-0.119	0.925	0.798	0.969	0.767	1.000	0.593	0.490	0.488	0.477	0.301	0.247	0.316
Synthetic	-0.086	0.927	0.826	0.961	0.763	1.000	0.674	0.423	0.397	0.457	0.318	0.289	0.426
7: Historical	-0.117	0.582	0.656	0.662	0.848	0.593	1.000	0.115	0.295	0.662	0.486	0.599	0.587
Synthetic	-0.099	0.677	0.663	0.693	0.684	0.674	1.000	0.197	0.338	0.494	0.372	0.396	0.494
8: Historical	0.142	0.518	0.269	0.435	0.268	0.490	0.115	1.000	0.335	0.233	-0.036	-0.080	-0.096
Synthetic	-0.007	0.442	0.339	0.395	0.320	0.423	0.197	1.000	0.159	0.181	-0.050	0.009	-0.014
9: Historical	-0.133	0.386	0.364	0.459	0.382	0.488	0.295	0.335	1.000	0.215	0.071	0.075	0.079
Synthetic	-0.024	0.376	0.346	0.394	0.299	0.397	0.338	0.159	1.000	0.120	0.111	0.091	0.157
10: Historical	0.001	0.528	0.469	0.511	0.564	0.477	0.662	0.233	0.215	1.000	0.425	0.421	0.450
Synthetic	-0.075	0.460	0.512	0.490	0.485	0.457	0.494	0.181	0.120	1.000	0.388	0.355	0.444
11: Historical	-0.175	0.418	0.462	0.395	0.428	0.301	0.486	-0.036	0.071	0.425	1.000	0.763	0.832
Synthetic	-0.083	0.375	0.417	0.382	0.320	0.318	0.372	-0.050	0.111	0.388	1.000	0.731	0.792
12: Historical	-0.011	0.248	0.411	0.331	0.472	0.247	0.599	-0.080	0.075	0.421	0.763	1.000	0.762
Synthetic	0.076	0.299	0.382	0.339	0.285	0.289	0.396	0.009	0.091	0.355	0.731	1.000	0.741
13: Historical	-0.130	0.357	0.459	0.403	0.476	0.316	0.587	-0.096	0.079	0.450	0.832	0.762	1.000
Synthetic	-0.053	0.447	0.509	0.480	0.399	0.426	0.494	-0.014	0.157	0.444	0.792	0.741	1.000

MARCH LAG 0 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.331	-0.284	-0.324	-0.306	-0.297	-0.219	-0.155	0.118	-0.239	-0.295	-0.227	-0.343
Synthetic	1.000	-0.264	-0.183	-0.253	-0.229	-0.239	-0.157	-0.068	0.041	-0.187	-0.237	-0.198	-0.258
2: Historical	-0.331	1.000	0.837	0.931	0.731	0.913	0.678	0.343	0.240	0.639	0.493	0.421	0.613
Synthetic	-0.264	1.000	0.854	0.924	0.716	0.904	0.721	0.315	0.296	0.491	0.376	0.358	0.433
3: Historical	-0.284	0.837	1.000	0.914	0.796	0.844	0.856	0.251	0.231	0.719	0.416	0.339	0.537
Synthetic	-0.183	0.854	1.000	0.896	0.692	0.845	0.735	0.243	0.399	0.480	0.364	0.349	0.419
4: Historical	-0.324	0.931	0.914	1.000	0.802	0.973	0.797	0.275	0.275	0.695	0.451	0.414	0.594
Synthetic	-0.253	0.924	0.896	1.000	0.747	0.962	0.766	0.278	0.343	0.513	0.387	0.382	0.446
5: Historical	-0.306	0.731	0.796	0.802	1.000	0.753	0.790	0.040	0.175	0.445	0.482	0.379	0.532
Synthetic	-0.229	0.716	0.692	0.747	1.000	0.727	0.791	0.095	0.224	0.563	0.513	0.479	0.529
6: Historical	-0.297	0.913	0.844	0.973	0.753	1.000	0.736	0.253	0.302	0.656	0.415	0.403	0.571
Synthetic	-0.239	0.904	0.845	0.962	0.727	1.000	0.743	0.295	0.333	0.503	0.353	0.357	0.409
7: Historical	-0.219	0.678	0.856	0.797	0.790	0.736	1.000	0.081	0.214	0.647	0.303	0.251	0.435
Synthetic	-0.157	0.721	0.735	0.766	0.791	0.743	1.000	0.153	0.352	0.611	0.390	0.344	0.455
8: Historical	-0.155	0.343	0.251	0.275	0.040	0.253	0.081	1.000	0.052	0.617	0.441	0.407	0.478
Synthetic	-0.068	0.315	0.243	0.278	0.095	0.295	0.153	1.000	0.070	0.146	0.051	0.050	0.048
9: Historical	0.118	0.240	0.231	0.275	0.175	0.302	0.214	0.052	1.000	0.167	0.085	0.072	0.033
Synthetic	0.041	0.296	0.399	0.343	0.224	0.333	0.352	0.070	1.000	0.337	0.186	0.158	0.168
10: Historical	-0.239	0.639	0.719	0.695	0.445	0.656	0.647	0.617	0.167	1.000	0.469	0.414	0.595
Synthetic	-0.187	0.491	0.480	0.513	0.563	0.503	0.611	0.146	0.337	1.000	0.405	0.370	0.412
11: Historical	-0.295	0.493	0.416	0.451	0.482	0.415	0.303	0.441	0.085	0.469	1.000	0.782	0.850
Synthetic	-0.237	0.376	0.364	0.387	0.513	0.353	0.390	0.051	0.186	0.405	1.000	0.812	0.864
12: Historical	-0.227	0.421	0.339	0.414	0.379	0.403	0.251	0.407	0.072	0.414	0.782	1.000	0.711
Synthetic	-0.198	0.358	0.349	0.382	0.479	0.357	0.344	0.050	0.158	0.370	0.812	1.000	0.739
13: Historical	-0.343	0.613	0.537	0.594	0.532	0.571	0.435	0.478	0.033	0.595	0.850	0.711	1.000
Synthetic	-0.258	0.433	0.419	0.446	0.529	0.409	0.455	0.048	0.168	0.412	0.864	0.739	1.000

APRIL LAG 0 CORRELATION COEFFICIENTS

(generation using no lag 12 terms)

		1	2	3	4	5	6	7	8	9	10	11	12	13
1:	Historical	1.000	-0.572	-0.524	-0.562	-0.547	-0.545	-0.503	-0.135	-0.156	-0.497	-0.235	-0.174	-0.271
	Synthetic	1.000	-0.349	-0.253	-0.304	-0.306	-0.280	-0.202	0.045	-0.064	-0.177	-0.223	-0.146	-0.237
2:	Historical	-0.572	1.000	0.954	0.980	0.915	0.975	0.842	0.630	0.426	0.827	0.367	0.289	0.364
	Synthetic	-0.349	1.000	0.862	0.921	0.750	0.903	0.649	0.197	0.225	0.345	0.394	0.241	0.410
3:	Historical	-0.524	0.954	1.000	0.968	0.928	0.956	0.885	0.641	0.374	0.864	0.351	0.261	0.348
	Synthetic	-0.253	0.862	1.000	0.910	0.745	0.863	0.635	0.166	0.180	0.364	0.366	0.250	0.401
4:	Historical	-0.562	0.980	0.968	1.000	0.937	0.986	0.876	0.624	0.413	0.852	0.360	0.285	0.359
	Synthetic	-0.304	0.921	0.910	1.000	0.769	0.958	0.693	0.192	0.166	0.367	0.393	0.257	0.427
5:	Historical	-0.547	0.915	0.928	0.937	1.000	0.934	0.904	0.489	0.377	0.831	0.332	0.310	0.340
	Synthetic	-0.306	0.750	0.745	0.769	1.000	0.754	0.696	0.137	0.151	0.422	0.380	0.306	0.429
6:	Historical	-0.545	0.975	0.956	0.986	0.934	1.000	0.877	0.615	0.442	0.851	0.339	0.276	0.331
	Synthetic	-0.280	0.903	0.863	0.958	0.754	1.000	0.697	0.217	0.168	0.361	0.375	0.236	0.410
7:	Historical	-0.503	0.842	0.885	0.876	0.904	0.877	1.000	0.431	0.386	0.931	0.326	0.228	0.251
	Synthetic	-0.202	0.649	0.635	0.693	0.696	0.697	1.000	0.096	0.072	0.349	0.314	0.229	0.321
8:	Historical	-0.135	0.630	0.641	0.624	0.489	0.615	0.431	1.000	0.305	0.538	0.220	0.126	0.205
	Synthetic	0.045	0.197	0.166	0.192	0.137	0.217	0.096	1.000	0.153	0.105	0.066	0.029	0.097
9:	Historical	-0.156	0.426	0.374	0.413	0.377	0.442	0.386	0.305	1.000	0.377	-0.031	0.002	-0.059
	Synthetic	-0.064	0.225	0.180	0.166	0.151	0.168	0.072	0.153	1.000	0.194	0.022	-0.031	-0.021
10:	Historical	-0.497	0.827	0.864	0.852	0.831	0.851	0.931	0.538	0.377	1.000	0.383	0.301	0.303
	Synthetic	-0.177	0.345	0.364	0.367	0.422	0.361	0.349	0.105	0.194	1.000	0.310	0.255	0.289
11:	Historical	-0.235	0.367	0.351	0.360	0.332	0.339	0.326	0.220	-0.031	0.383	1.000	0.783	0.861
	Synthetic	-0.223	0.394	0.366	0.393	0.380	0.375	0.314	0.066	0.022	0.310	1.000	0.810	0.898
12:	Historical	-0.174	0.289	0.261	0.285	0.310	0.276	0.228	0.126	0.002	0.301	0.783	1.000	0.753
	Synthetic	-0.146	0.241	0.250	0.257	0.306	0.236	0.229	0.029	-0.031	0.255	0.810	1.000	0.775
13:	Historical	-0.271	0.364	0.348	0.359	0.340	0.331	0.251	0.205	-0.059	0.303	0.861	0.753	1.000
	Synthetic	-0.237	0.410	0.401	0.427	0.429	0.410	0.321	0.097	-0.021	0.289	0.898	0.775	1.000

MAY LAG 0 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.523	-0.385	-0.445	-0.399	-0.404	-0.313	-0.022	0.064	-0.160	-0.362	-0.303	-0.282
Synthetic	1.000	-0.459	-0.370	-0.391	-0.398	-0.342	-0.315	0.102	0.050	-0.246	-0.332	-0.276	-0.280
2: Historical	-0.523	1.000	0.930	0.960	0.876	0.948	0.807	0.571	0.440	0.744	0.600	0.557	0.585
Synthetic	-0.459	1.000	0.868	0.921	0.780	0.896	0.708	0.069	0.146	0.490	0.518	0.436	0.478
3: Historical	-0.385	0.930	1.000	0.967	0.904	0.953	0.893	0.579	0.439	0.803	0.612	0.583	0.655
Synthetic	-0.370	0.868	1.000	0.920	0.826	0.884	0.778	0.096	0.137	0.491	0.515	0.446	0.507
4: Historical	-0.445	0.960	0.967	1.000	0.926	0.984	0.876	0.618	0.467	0.812	0.594	0.578	0.624
Synthetic	-0.391	0.921	0.920	1.000	0.853	0.964	0.781	0.107	0.126	0.494	0.512	0.441	0.503
5: Historical	-0.399	0.876	0.904	0.926	1.000	0.934	0.912	0.615	0.457	0.838	0.526	0.538	0.544
Synthetic	-0.398	0.780	0.826	0.853	1.000	0.830	0.835	0.052	0.122	0.507	0.484	0.438	0.475
6: Historical	-0.404	0.948	0.953	0.984	0.934	1.000	0.879	0.655	0.506	0.847	0.569	0.566	0.605
Synthetic	-0.342	0.896	0.884	0.964	0.830	1.000	0.771	0.121	0.120	0.476	0.478	0.416	0.474
7: Historical	-0.313	0.807	0.893	0.876	0.912	0.879	1.000	0.516	0.322	0.780	0.512	0.510	0.561
Synthetic	-0.315	0.708	0.778	0.781	0.835	0.771	1.000	0.053	0.112	0.505	0.426	0.392	0.423
8: Historical	-0.022	0.571	0.579	0.618	0.615	0.655	0.516	1.000	0.659	0.771	0.333	0.432	0.376
Synthetic	0.102	0.069	0.096	0.107	0.052	0.121	0.053	1.000	0.076	0.034	0.018	0.038	0.034
9: Historical	0.064	0.440	0.439	0.467	0.457	0.506	0.322	0.659	1.000	0.651	0.190	0.320	0.250
Synthetic	0.050	0.146	0.137	0.126	0.122	0.120	0.112	0.076	1.000	0.070	0.092	0.078	0.101
10: Historical	-0.160	0.744	0.803	0.812	0.838	0.847	0.780	0.771	0.651	1.000	0.449	0.513	0.524
Synthetic	-0.246	0.490	0.491	0.494	0.507	0.476	0.505	0.034	0.070	1.000	0.280	0.282	0.265
11: Historical	-0.362	0.600	0.612	0.594	0.526	0.569	0.512	0.333	0.190	0.449	1.000	0.862	0.895
Synthetic	-0.332	0.518	0.515	0.512	0.484	0.478	0.426	0.018	0.092	0.280	1.000	0.845	0.899
12: Historical	-0.303	0.557	0.583	0.578	0.538	0.566	0.510	0.432	0.320	0.513	0.862	1.000	0.800
Synthetic	-0.276	0.436	0.446	0.441	0.438	0.416	0.392	0.038	0.078	0.282	0.845	1.000	0.800
13: Historical	-0.282	0.585	0.655	0.624	0.544	0.605	0.561	0.376	0.250	0.524	0.895	0.800	1.000
Synthetic	-0.280	0.478	0.507	0.503	0.475	0.474	0.423	0.034	0.101	0.265	0.899	0.800	1.000

JUNE LAG 0 CORRELATION COEFFICIENTS

(generation using no lag 12 terms)

		1	2	3	4	5	6	7	8	9	10	11	12	13
1:	Historical	1.000	-0.595	-0.531	-0.559	-0.531	-0.541	-0.440	-0.304	-0.111	-0.211	-0.171	-0.211	-0.223
	Synthetic	1.000	-0.515	-0.457	-0.487	-0.511	-0.474	-0.436	-0.137	-0.103	-0.302	-0.144	-0.194	-0.202
2:	Historical	-0.595	1.000	0.947	0.975	0.920	0.969	0.839	0.761	0.408	0.708	0.488	0.357	0.508
	Synthetic	-0.515	1.000	0.898	0.930	0.829	0.915	0.824	0.338	0.118	0.608	0.335	0.275	0.339
3:	Historical	-0.531	0.947	1.000	0.963	0.926	0.940	0.896	0.669	0.324	0.745	0.517	0.375	0.518
	Synthetic	-0.457	0.898	1.000	0.920	0.822	0.885	0.841	0.291	0.076	0.593	0.335	0.293	0.340
4:	Historical	-0.559	0.975	0.963	1.000	0.947	0.985	0.879	0.744	0.399	0.743	0.506	0.382	0.511
	Synthetic	-0.487	0.930	0.920	1.000	0.868	0.967	0.854	0.370	0.106	0.638	0.344	0.307	0.341
5:	Historical	-0.531	0.920	0.926	0.947	1.000	0.940	0.900	0.688	0.446	0.769	0.484	0.370	0.466
	Synthetic	-0.511	0.829	0.822	0.868	1.000	0.859	0.876	0.304	0.133	0.645	0.335	0.316	0.317
6:	Historical	-0.541	0.969	0.940	0.985	0.940	1.000	0.865	0.766	0.431	0.754	0.494	0.371	0.500
	Synthetic	-0.474	0.915	0.885	0.967	0.859	1.000	0.842	0.385	0.107	0.641	0.334	0.299	0.329
7:	Historical	-0.440	0.839	0.896	0.879	0.900	0.865	1.000	0.525	0.297	0.757	0.524	0.415	0.496
	Synthetic	-0.436	0.824	0.841	0.854	0.876	0.842	1.000	0.234	0.089	0.652	0.328	0.319	0.315
8:	Historical	-0.304	0.761	0.669	0.744	0.688	0.766	0.525	1.000	0.608	0.623	0.314	0.170	0.328
	Synthetic	-0.137	0.338	0.291	0.370	0.304	0.385	0.234	1.000	0.127	0.283	0.206	0.146	0.186
9:	Historical	-0.111	0.408	0.324	0.399	0.446	0.431	0.297	0.608	1.000	0.567	0.165	0.072	0.156
	Synthetic	-0.103	0.118	0.076	0.106	0.133	0.107	0.089	0.127	1.000	0.131	0.112	0.078	0.101
10:	Historical	-0.211	0.708	0.745	0.743	0.769	0.754	0.757	0.623	0.567	1.000	0.349	0.188	0.313
	Synthetic	-0.302	0.608	0.593	0.638	0.645	0.641	0.652	0.283	0.131	1.000	0.257	0.258	0.235
11:	Historical	-0.171	0.488	0.517	0.506	0.484	0.494	0.524	0.314	0.165	0.349	1.000	0.806	0.877
	Synthetic	-0.144	0.335	0.335	0.344	0.335	0.334	0.328	0.206	0.112	0.257	1.000	0.809	0.884
12:	Historical	-0.211	0.357	0.375	0.382	0.370	0.371	0.415	0.170	0.072	0.188	0.806	1.000	0.790
	Synthetic	-0.194	0.275	0.293	0.307	0.316	0.299	0.319	0.146	0.078	0.258	0.809	1.000	0.807
13:	Historical	-0.223	0.508	0.518	0.511	0.466	0.500	0.496	0.328	0.156	0.313	0.877	0.790	1.000
	Synthetic	-0.202	0.339	0.340	0.341	0.317	0.329	0.315	0.186	0.101	0.235	0.884	0.807	1.000

JULY LAG 0 CORRELATION COEFFICIENTS

(generation using no lag 12 terms)

1: Historical	1.000	-0.611	-0.584	-0.567	-0.481	-0.525	-0.473	-0.165	-0.107	-0.187	-0.364	-0.357	-0.344
Synthetic	1.000	-0.547	-0.520	-0.519	-0.465	-0.477	-0.444	-0.113	-0.063	-0.226	-0.289	-0.307	-0.296
2: Historical	-0.611	1.000	0.915	0.945	0.872	0.929	0.847	0.592	0.333	0.657	0.419	0.403	0.426
Synthetic	-0.547	1.000	0.917	0.947	0.837	0.933	0.853	0.437	0.151	0.609	0.432	0.388	0.428
3: Historical	-0.584	0.915	1.000	0.955	0.907	0.927	0.902	0.538	0.256	0.655	0.447	0.398	0.430
Synthetic	-0.520	0.917	1.000	0.943	0.860	0.916	0.895	0.391	0.111	0.627	0.463	0.384	0.442
4: Historical	-0.567	0.945	0.955	1.000	0.943	0.984	0.925	0.597	0.337	0.680	0.438	0.428	0.461
Synthetic	-0.519	0.947	0.943	1.000	0.890	0.967	0.902	0.430	0.136	0.648	0.454	0.407	0.460
5: Historical	-0.481	0.872	0.907	0.943	1.000	0.944	0.916	0.612	0.434	0.724	0.440	0.435	0.468
Synthetic	-0.465	0.837	0.860	0.890	1.000	0.884	0.881	0.361	0.183	0.671	0.461	0.431	0.473
6: Historical	-0.525	0.929	0.927	0.984	0.944	1.000	0.926	0.608	0.362	0.686	0.425	0.424	0.459
Synthetic	-0.477	0.933	0.916	0.967	0.884	1.000	0.897	0.441	0.140	0.661	0.434	0.392	0.447
7: Historical	-0.473	0.847	0.902	0.925	0.916	0.926	1.000	0.512	0.332	0.759	0.383	0.406	0.403
Synthetic	-0.444	0.853	0.895	0.902	0.881	0.897	1.000	0.344	0.108	0.721	0.423	0.390	0.429
8: Historical	-0.165	0.592	0.538	0.597	0.612	0.608	0.512	1.000	0.617	0.530	0.366	0.218	0.351
Synthetic	-0.113	0.437	0.391	0.430	0.361	0.441	0.344	1.000	0.136	0.296	0.247	0.154	0.214
9: Historical	-0.107	0.333	0.256	0.337	0.434	0.362	0.332	0.617	1.000	0.381	0.259	0.218	0.256
Synthetic	-0.063	0.151	0.111	0.136	0.183	0.140	0.108	0.136	1.000	0.129	0.153	0.114	0.155
10: Historical	-0.187	0.657	0.655	0.680	0.724	0.686	0.759	0.530	0.381	1.000	0.192	0.203	0.219
Synthetic	-0.226	0.609	0.627	0.648	0.671	0.661	0.721	0.296	0.129	1.000	0.278	0.260	0.294
11: Historical	-0.364	0.419	0.447	0.438	0.440	0.425	0.383	0.366	0.259	0.192	1.000	0.763	0.900
Synthetic	-0.289	0.432	0.463	0.454	0.461	0.434	0.423	0.247	0.153	0.278	1.000	0.762	0.899
12: Historical	-0.357	0.403	0.398	0.428	0.435	0.424	0.406	0.218	0.218	0.203	0.763	1.000	0.782
Synthetic	-0.307	0.388	0.384	0.407	0.431	0.392	0.390	0.154	0.114	0.260	0.762	1.000	0.775
13: Historical	-0.344	0.426	0.430	0.461	0.468	0.459	0.403	0.351	0.256	0.219	0.900	0.782	1.000
Synthetic	-0.296	0.428	0.442	0.460	0.473	0.447	0.429	0.214	0.155	0.294	0.899	0.775	1.000

AUGUST LAG 0 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

		1	2	3	4	5	6	7	8	9	10	11	12	13
1:	Historical	1.000	-0.533	-0.540	-0.534	-0.459	-0.502	-0.497	-0.146	0.004	-0.270	-0.322	-0.338	-0.363
	Synthetic	1.000	-0.413	-0.490	-0.418	-0.351	-0.387	-0.390	-0.067	-0.044	-0.314	-0.286	-0.299	-0.286
2:	Historical	-0.533	1.000	0.930	0.974	0.877	0.967	0.916	0.629	0.249	0.763	0.536	0.511	0.604
	Synthetic	-0.413	1.000	0.878	0.962	0.873	0.952	0.896	0.495	0.188	0.678	0.498	0.438	0.557
3:	Historical	-0.540	0.930	1.000	0.951	0.850	0.918	0.882	0.591	0.238	0.727	0.529	0.498	0.610
	Synthetic	-0.490	0.878	1.000	0.895	0.817	0.855	0.828	0.527	0.185	0.733	0.529	0.480	0.579
4:	Historical	-0.534	0.974	0.951	1.000	0.905	0.983	0.937	0.624	0.232	0.778	0.553	0.546	0.626
	Synthetic	-0.418	0.962	0.895	1.000	0.905	0.972	0.926	0.499	0.166	0.709	0.517	0.478	0.587
5:	Historical	-0.459	0.877	0.850	0.905	1.000	0.903	0.898	0.566	0.244	0.776	0.586	0.580	0.581
	Synthetic	-0.351	0.873	0.817	0.905	1.000	0.897	0.896	0.447	0.149	0.704	0.531	0.495	0.553
6:	Historical	-0.502	0.967	0.918	0.983	0.903	1.000	0.938	0.625	0.228	0.786	0.536	0.546	0.607
	Synthetic	-0.387	0.952	0.855	0.972	0.897	1.000	0.926	0.490	0.153	0.692	0.490	0.457	0.563
7:	Historical	-0.497	0.916	0.882	0.937	0.898	0.938	1.000	0.530	0.212	0.785	0.539	0.526	0.611
	Synthetic	-0.390	0.896	0.828	0.926	0.896	0.926	1.000	0.427	0.141	0.707	0.501	0.463	0.580
8:	Historical	-0.146	0.629	0.591	0.624	0.566	0.625	0.530	1.000	0.383	0.607	0.295	0.298	0.324
	Synthetic	-0.067	0.495	0.527	0.499	0.447	0.490	0.427	1.000	0.252	0.503	0.261	0.251	0.297
9:	Historical	0.004	0.249	0.238	0.232	0.244	0.228	0.212	0.383	1.000	0.352	0.067	0.094	0.030
	Synthetic	-0.044	0.188	0.185	0.166	0.149	0.153	0.141	0.252	1.000	0.249	0.107	0.124	0.044
10:	Historical	-0.270	0.763	0.727	0.778	0.776	0.786	0.785	0.607	0.352	1.000	0.370	0.375	0.422
	Synthetic	-0.314	0.678	0.733	0.709	0.704	0.692	0.707	0.503	0.249	1.000	0.434	0.414	0.439
11:	Historical	-0.322	0.536	0.529	0.553	0.586	0.536	0.539	0.295	0.067	0.370	1.000	0.827	0.882
	Synthetic	-0.286	0.498	0.529	0.517	0.531	0.490	0.501	0.261	0.107	0.434	1.000	0.831	0.872
12:	Historical	-0.338	0.511	0.498	0.546	0.580	0.546	0.526	0.298	0.094	0.375	0.827	1.000	0.802
	Synthetic	-0.299	0.438	0.480	0.478	0.495	0.457	0.463	0.251	0.124	0.414	0.831	1.000	0.808
13:	Historical	-0.363	0.604	0.610	0.626	0.581	0.607	0.611	0.324	0.030	0.422	0.882	0.802	1.000
	Synthetic	-0.286	0.557	0.579	0.587	0.553	0.563	0.580	0.297	0.044	0.439	0.872	0.808	1.000

SEPTEMBER LAG 0 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.312	-0.378	-0.335	-0.379	-0.256	-0.327	0.061	-0.006	-0.308	-0.274	-0.310	-0.333
Synthetic	1.000	-0.310	-0.398	-0.392	-0.405	-0.338	-0.383	-0.093	0.040	-0.288	-0.264	-0.297	-0.325
2: Historical	-0.312	1.000	0.906	0.959	0.868	0.943	0.870	0.693	0.268	0.791	0.571	0.521	0.538
Synthetic	-0.310	1.000	0.881	0.912	0.819	0.897	0.818	0.526	0.178	0.687	0.541	0.493	0.517
3: Historical	-0.378	0.906	1.000	0.941	0.887	0.901	0.878	0.609	0.298	0.797	0.496	0.476	0.467
Synthetic	-0.398	0.881	1.000	0.937	0.873	0.900	0.879	0.545	0.223	0.714	0.528	0.475	0.500
4: Historical	-0.335	0.959	0.941	1.000	0.907	0.979	0.915	0.684	0.263	0.812	0.556	0.503	0.531
Synthetic	-0.392	0.912	0.937	1.000	0.893	0.968	0.903	0.559	0.211	0.749	0.548	0.491	0.521
5: Historical	-0.379	0.868	0.887	0.907	1.000	0.882	0.879	0.550	0.241	0.790	0.569	0.574	0.567
Synthetic	-0.405	0.819	0.873	0.893	1.000	0.874	0.861	0.473	0.237	0.712	0.568	0.555	0.566
6: Historical	-0.256	0.943	0.901	0.979	0.882	1.000	0.899	0.713	0.245	0.796	0.549	0.478	0.522
Synthetic	-0.338	0.897	0.900	0.968	0.874	1.000	0.896	0.567	0.211	0.752	0.531	0.468	0.501
7: Historical	-0.327	0.870	0.878	0.915	0.879	0.899	1.000	0.555	0.223	0.803	0.579	0.517	0.546
Synthetic	-0.383	0.818	0.879	0.903	0.861	0.896	1.000	0.482	0.219	0.763	0.558	0.498	0.528
8: Historical	0.061	0.693	0.609	0.684	0.550	0.713	0.555	1.000	0.322	0.645	0.490	0.352	0.451
Synthetic	-0.093	0.526	0.545	0.559	0.473	0.567	0.482	1.000	0.262	0.588	0.332	0.263	0.300
9: Historical	-0.006	0.268	0.298	0.263	0.241	0.245	0.223	0.322	1.000	0.361	0.157	0.169	0.149
Synthetic	0.040	0.178	0.223	0.211	0.237	0.211	0.219	0.262	1.000	0.279	0.133	0.105	0.100
10: Historical	-0.308	0.791	0.797	0.812	0.790	0.796	0.803	0.645	0.361	1.000	0.481	0.465	0.489
Synthetic	-0.288	0.687	0.714	0.749	0.712	0.752	0.763	0.588	0.279	1.000	0.489	0.389	0.448
11: Historical	-0.274	0.571	0.496	0.556	0.569	0.549	0.579	0.490	0.157	0.481	1.000	0.780	0.907
Synthetic	-0.264	0.541	0.528	0.548	0.568	0.531	0.558	0.332	0.133	0.489	1.000	0.752	0.891
12: Historical	-0.310	0.521	0.476	0.503	0.574	0.478	0.517	0.352	0.169	0.465	0.780	1.000	0.829
Synthetic	-0.297	0.493	0.475	0.491	0.555	0.468	0.498	0.263	0.105	0.389	0.752	1.000	0.805
13: Historical	-0.333	0.538	0.467	0.531	0.567	0.522	0.546	0.451	0.149	0.489	0.907	0.829	1.000
Synthetic	-0.325	0.517	0.500	0.521	0.566	0.501	0.528	0.300	0.100	0.448	0.891	0.805	1.000

OCTOBER LAG 0 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.602	-0.666	-0.663	-0.676	-0.602	-0.575	-0.229	-0.002	-0.455	-0.349	-0.271	-0.309
Synthetic	1.000	-0.651	-0.688	-0.699	-0.669	-0.658	-0.599	-0.214	-0.090	-0.351	-0.362	-0.299	-0.365
2: Historical	-0.602	1.000	0.892	0.963	0.884	0.961	0.851	0.773	0.181	0.741	0.558	0.518	0.609
Synthetic	-0.651	1.000	0.861	0.893	0.830	0.881	0.841	0.538	0.319	0.552	0.497	0.438	0.556
3: Historical	-0.666	0.892	1.000	0.943	0.893	0.913	0.844	0.647	0.223	0.755	0.582	0.503	0.571
Synthetic	-0.688	0.861	1.000	0.939	0.882	0.912	0.834	0.514	0.346	0.648	0.586	0.515	0.631
4: Historical	-0.663	0.963	0.943	1.000	0.932	0.982	0.886	0.737	0.201	0.791	0.579	0.520	0.610
Synthetic	-0.699	0.893	0.939	1.000	0.916	0.970	0.822	0.525	0.351	0.658	0.550	0.494	0.612
5: Historical	-0.676	0.884	0.893	0.932	1.000	0.923	0.893	0.644	0.204	0.808	0.546	0.545	0.592
Synthetic	-0.669	0.830	0.882	0.916	1.000	0.908	0.832	0.498	0.379	0.661	0.518	0.509	0.602
6: Historical	-0.602	0.961	0.913	0.982	0.923	1.000	0.891	0.764	0.196	0.801	0.582	0.532	0.628
Synthetic	-0.658	0.881	0.912	0.970	0.908	1.000	0.823	0.541	0.357	0.675	0.539	0.486	0.609
7: Historical	-0.575	0.851	0.844	0.886	0.893	0.891	1.000	0.653	0.182	0.825	0.589	0.598	0.655
Synthetic	-0.599	0.841	0.834	0.822	0.832	0.823	1.000	0.506	0.307	0.650	0.504	0.477	0.578
8: Historical	-0.229	0.773	0.647	0.737	0.644	0.764	0.653	1.000	0.315	0.690	0.542	0.496	0.611
Synthetic	-0.214	0.538	0.514	0.525	0.498	0.541	0.506	1.000	0.328	0.446	0.391	0.301	0.443
9: Historical	-0.002	0.181	0.223	0.201	0.204	0.196	0.182	0.315	1.000	0.264	0.241	0.211	0.292
Synthetic	-0.090	0.319	0.346	0.351	0.379	0.357	0.307	0.328	1.000	0.402	0.294	0.303	0.373
10: Historical	-0.455	0.741	0.755	0.791	0.808	0.801	0.825	0.690	0.264	1.000	0.502	0.462	0.512
Synthetic	-0.351	0.552	0.648	0.658	0.661	0.675	0.650	0.446	0.402	1.000	0.409	0.369	0.436
11: Historical	-0.349	0.558	0.582	0.579	0.546	0.582	0.589	0.542	0.241	0.502	1.000	0.797	0.905
Synthetic	-0.362	0.497	0.586	0.550	0.518	0.539	0.504	0.391	0.294	0.409	1.000	0.800	0.882
12: Historical	-0.271	0.518	0.503	0.520	0.545	0.532	0.598	0.496	0.211	0.462	0.797	1.000	0.824
Synthetic	-0.299	0.438	0.515	0.494	0.509	0.486	0.477	0.301	0.303	0.369	0.800	1.000	0.809
13: Historical	-0.309	0.609	0.571	0.610	0.592	0.628	0.655	0.611	0.292	0.512	0.905	0.824	1.000
Synthetic	-0.365	0.556	0.631	0.612	0.602	0.609	0.578	0.443	0.373	0.436	0.882	0.809	1.000

NOVEMBER LAG 0 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.516	-0.512	-0.588	-0.640	-0.531	-0.399	-0.194	-0.074	-0.281	-0.343	-0.263	-0.280
Synthetic	1.000	-0.535	-0.542	-0.594	-0.613	-0.554	-0.482	-0.191	-0.069	-0.220	-0.326	-0.290	-0.279
2: Historical	-0.516	1.000	0.884	0.944	0.845	0.946	0.865	0.667	0.237	0.695	0.478	0.367	0.441
Synthetic	-0.535	1.000	0.900	0.939	0.855	0.941	0.863	0.429	0.274	0.515	0.450	0.355	0.434
3: Historical	-0.512	0.884	1.000	0.933	0.885	0.903	0.880	0.638	0.258	0.747	0.577	0.449	0.534
Synthetic	-0.542	0.900	1.000	0.933	0.890	0.915	0.900	0.443	0.320	0.559	0.483	0.409	0.492
4: Historical	-0.588	0.944	0.933	1.000	0.930	0.981	0.890	0.704	0.252	0.743	0.494	0.398	0.458
Synthetic	-0.594	0.939	0.933	1.000	0.922	0.973	0.888	0.466	0.303	0.549	0.468	0.376	0.454
5: Historical	-0.640	0.845	0.885	0.930	1.000	0.904	0.849	0.610	0.257	0.710	0.457	0.357	0.421
Synthetic	-0.613	0.855	0.890	0.922	1.000	0.907	0.870	0.419	0.289	0.543	0.427	0.348	0.416
6: Historical	-0.531	0.946	0.903	0.981	0.904	1.000	0.892	0.728	0.251	0.743	0.460	0.373	0.434
Synthetic	-0.554	0.941	0.915	0.973	0.907	1.000	0.886	0.485	0.309	0.545	0.456	0.366	0.443
7: Historical	-0.399	0.865	0.880	0.890	0.849	0.892	1.000	0.694	0.216	0.808	0.509	0.378	0.486
Synthetic	-0.482	0.863	0.900	0.888	0.870	0.886	1.000	0.438	0.335	0.604	0.473	0.358	0.471
8: Historical	-0.194	0.667	0.638	0.704	0.610	0.728	0.694	1.000	0.291	0.702	0.343	0.325	0.341
Synthetic	-0.191	0.429	0.443	0.466	0.419	0.485	0.438	1.000	0.258	0.350	0.259	0.244	0.261
9: Historical	-0.074	0.237	0.258	0.252	0.257	0.251	0.216	0.291	1.000	0.215	0.218	0.293	0.195
Synthetic	-0.069	0.274	0.320	0.303	0.289	0.309	0.335	0.258	1.000	0.367	0.207	0.165	0.192
10: Historical	-0.281	0.695	0.747	0.743	0.710	0.743	0.808	0.702	0.215	1.000	0.562	0.420	0.452
Synthetic	-0.220	0.515	0.559	0.549	0.543	0.545	0.604	0.350	0.367	1.000	0.398	0.303	0.335
11: Historical	-0.343	0.478	0.577	0.494	0.457	0.460	0.509	0.343	0.218	0.562	1.000	0.769	0.855
Synthetic	-0.326	0.450	0.483	0.468	0.427	0.456	0.473	0.259	0.207	0.398	1.000	0.721	0.848
12: Historical	-0.263	0.367	0.449	0.398	0.357	0.373	0.378	0.325	0.293	0.420	0.769	1.000	0.684
Synthetic	-0.290	0.355	0.409	0.376	0.348	0.366	0.358	0.244	0.165	0.303	0.721	1.000	0.686
13: Historical	-0.280	0.441	0.534	0.458	0.421	0.434	0.486	0.341	0.195	0.452	0.855	0.684	1.000
Synthetic	-0.279	0.434	0.492	0.454	0.416	0.443	0.471	0.261	0.192	0.335	0.848	0.686	1.000

DECEMBER LAG 0 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

		1	2	3	4	5	6	7	8	9	10	11	12	13
1:	Historical	1.000	-0.373	-0.307	-0.342	-0.283	-0.309	-0.257	-0.061	0.050	-0.227	-0.118	-0.140	-0.165
	Synthetic	1.000	-0.434	-0.363	-0.364	-0.374	-0.344	-0.317	-0.049	0.059	-0.126	-0.127	-0.226	-0.131
2:	Historical	-0.373	1.000	0.901	0.953	0.806	0.942	0.786	0.687	0.211	0.735	0.254	0.197	0.314
	Synthetic	-0.434	1.000	0.876	0.930	0.852	0.925	0.833	0.450	0.254	0.527	0.335	0.274	0.341
3:	Historical	-0.307	0.901	1.000	0.926	0.872	0.888	0.825	0.615	0.335	0.665	0.276	0.258	0.315
	Synthetic	-0.363	0.876	1.000	0.906	0.866	0.872	0.840	0.471	0.303	0.520	0.307	0.266	0.306
4:	Historical	-0.342	0.953	0.926	1.000	0.882	0.982	0.815	0.694	0.253	0.742	0.270	0.204	0.332
	Synthetic	-0.364	0.930	0.906	1.000	0.897	0.970	0.864	0.490	0.310	0.586	0.326	0.234	0.345
5:	Historical	-0.283	0.806	0.872	0.882	1.000	0.859	0.840	0.497	0.182	0.574	0.432	0.365	0.449
	Synthetic	-0.374	0.852	0.866	0.897	1.000	0.884	0.845	0.413	0.235	0.542	0.354	0.310	0.364
6:	Historical	-0.309	0.942	0.888	0.982	0.859	1.000	0.805	0.712	0.242	0.760	0.256	0.177	0.324
	Synthetic	-0.344	0.925	0.872	0.970	0.884	1.000	0.860	0.501	0.326	0.585	0.301	0.214	0.327
7:	Historical	-0.257	0.786	0.825	0.815	0.840	0.805	1.000	0.511	0.233	0.647	0.377	0.308	0.416
	Synthetic	-0.317	0.833	0.840	0.864	0.845	0.860	1.000	0.392	0.261	0.638	0.344	0.279	0.359
8:	Historical	-0.061	0.687	0.615	0.694	0.497	0.712	0.511	1.000	0.157	0.676	0.032	-0.104	0.065
	Synthetic	-0.049	0.450	0.471	0.490	0.413	0.501	0.392	1.000	0.188	0.260	0.053	-0.017	0.075
9:	Historical	0.050	0.211	0.335	0.253	0.182	0.242	0.233	0.157	1.000	0.124	0.026	0.082	-0.044
	Synthetic	0.059	0.254	0.303	0.310	0.235	0.326	0.261	0.188	1.000	0.176	0.042	-0.006	0.037
10:	Historical	-0.227	0.735	0.665	0.742	0.574	0.760	0.647	0.676	0.124	1.000	0.231	0.127	0.193
	Synthetic	-0.126	0.527	0.520	0.586	0.542	0.585	0.638	0.260	0.176	1.000	0.343	0.199	0.312
11:	Historical	-0.118	0.254	0.276	0.270	0.432	0.256	0.377	0.032	0.026	0.231	1.000	0.766	0.844
	Synthetic	-0.127	0.335	0.307	0.326	0.354	0.301	0.344	0.053	0.042	0.343	1.000	0.689	0.844
12:	Historical	-0.140	0.197	0.258	0.204	0.365	0.177	0.308	-0.104	0.082	0.127	0.766	1.000	0.740
	Synthetic	-0.226	0.274	0.266	0.234	0.310	0.214	0.279	-0.017	-0.006	0.199	0.689	1.000	0.683
13:	Historical	-0.165	0.314	0.315	0.332	0.449	0.324	0.416	0.065	-0.044	0.193	0.844	0.740	1.000
	Synthetic	-0.131	0.341	0.306	0.345	0.364	0.327	0.359	0.075	0.037	0.312	0.844	0.683	1.000

JANUARY LAG 0 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.469	-0.356	-0.366	-0.358	-0.326	-0.281	-0.141	0.013	-0.173	-0.258	-0.190	-0.242
Synthetic	1.000	-0.431	-0.358	-0.285	-0.319	-0.234	-0.244	-0.175	0.048	-0.102	-0.326	-0.252	-0.290
2: Historical	-0.469	1.000	0.879	0.943	0.872	0.925	0.849	0.393	0.236	0.606	0.562	0.410	0.535
Synthetic	-0.431	1.000	0.818	0.903	0.809	0.879	0.797	0.399	0.259	0.474	0.419	0.356	0.349
3: Historical	-0.356	0.879	1.000	0.900	0.876	0.832	0.818	0.219	0.315	0.491	0.480	0.282	0.497
Synthetic	-0.358	0.818	1.000	0.871	0.818	0.813	0.779	0.366	0.273	0.492	0.327	0.267	0.327
4: Historical	-0.366	0.943	0.900	1.000	0.894	0.976	0.863	0.303	0.255	0.545	0.572	0.384	0.531
Synthetic	-0.285	0.903	0.871	1.000	0.844	0.965	0.835	0.381	0.321	0.543	0.299	0.238	0.294
5: Historical	-0.358	0.872	0.876	0.894	1.000	0.864	0.888	0.237	0.190	0.533	0.507	0.344	0.490
Synthetic	-0.319	0.809	0.818	0.844	1.000	0.822	0.822	0.305	0.227	0.555	0.305	0.235	0.276
6: Historical	-0.326	0.925	0.832	0.976	0.864	1.000	0.854	0.351	0.237	0.563	0.584	0.414	0.528
Synthetic	-0.234	0.879	0.813	0.965	0.822	1.000	0.823	0.373	0.324	0.546	0.262	0.205	0.260
7: Historical	-0.281	0.849	0.818	0.863	0.888	0.854	1.000	0.360	0.229	0.652	0.520	0.342	0.492
Synthetic	-0.244	0.797	0.779	0.835	0.822	0.823	1.000	0.352	0.275	0.606	0.251	0.221	0.245
8: Historical	-0.141	0.393	0.219	0.303	0.237	0.351	0.360	1.000	0.195	0.607	0.317	0.340	0.278
Synthetic	-0.175	0.399	0.366	0.381	0.305	0.373	0.352	1.000	0.206	0.128	0.242	0.208	0.099
9: Historical	0.013	0.236	0.315	0.255	0.190	0.237	0.229	0.195	1.000	0.125	0.235	0.125	0.210
Synthetic	0.048	0.259	0.273	0.321	0.227	0.324	0.275	0.206	1.000	0.235	0.120	0.049	0.164
10: Historical	-0.173	0.606	0.491	0.545	0.533	0.563	0.652	0.607	0.125	1.000	0.328	0.314	0.304
Synthetic	-0.102	0.474	0.492	0.543	0.555	0.546	0.606	0.128	0.235	1.000	0.144	0.128	0.321
11: Historical	-0.258	0.562	0.480	0.572	0.507	0.584	0.520	0.317	0.235	0.328	1.000	0.746	0.845
Synthetic	-0.326	0.419	0.327	0.299	0.305	0.262	0.251	0.242	0.120	0.144	1.000	0.746	0.611
12: Historical	-0.190	0.410	0.282	0.384	0.344	0.414	0.342	0.340	0.125	0.314	0.746	1.000	0.685
Synthetic	-0.252	0.356	0.267	0.238	0.235	0.205	0.221	0.208	0.049	0.128	0.746	1.000	0.503
13: Historical	-0.242	0.535	0.497	0.531	0.490	0.528	0.492	0.278	0.210	0.304	0.845	0.685	1.000
Synthetic	-0.290	0.349	0.327	0.294	0.276	0.260	0.245	0.099	0.164	0.321	0.611	0.503	1.000

FEBRUARY LAG 0 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.154	-0.178	-0.154	-0.107	-0.119	-0.117	0.142	-0.133	0.001	-0.175	-0.011	-0.130
Synthetic	1.000	-0.102	-0.124	-0.090	-0.064	-0.066	-0.071	0.020	-0.011	-0.061	-0.138	0.014	-0.087
2: Historical	-0.154	1.000	0.801	0.933	0.752	0.925	0.582	0.518	0.386	0.528	0.418	0.248	0.357
Synthetic	-0.102	1.000	0.820	0.926	0.740	0.919	0.680	0.400	0.389	0.448	0.383	0.299	0.441
3: Historical	-0.178	0.801	1.000	0.892	0.823	0.798	0.656	0.269	0.364	0.469	0.462	0.411	0.459
Synthetic	-0.124	0.820	1.000	0.894	0.725	0.823	0.664	0.293	0.362	0.513	0.436	0.393	0.506
4: Historical	-0.154	0.933	0.892	1.000	0.830	0.969	0.662	0.435	0.459	0.511	0.395	0.331	0.403
Synthetic	-0.090	0.926	0.894	1.000	0.778	0.960	0.695	0.349	0.411	0.485	0.389	0.336	0.470
5: Historical	-0.107	0.752	0.823	0.830	1.000	0.767	0.848	0.268	0.382	0.564	0.428	0.472	0.476
Synthetic	-0.064	0.740	0.725	0.778	1.000	0.763	0.679	0.247	0.308	0.467	0.343	0.306	0.424
6: Historical	-0.119	0.925	0.798	0.969	0.767	1.000	0.593	0.490	0.488	0.477	0.301	0.247	0.316
Synthetic	-0.066	0.919	0.823	0.960	0.763	1.000	0.674	0.388	0.418	0.443	0.318	0.281	0.414
7: Historical	-0.117	0.582	0.656	0.662	0.848	0.593	1.000	0.115	0.295	0.662	0.486	0.599	0.587
Synthetic	-0.071	0.680	0.664	0.695	0.679	0.674	1.000	0.172	0.338	0.491	0.370	0.397	0.486
8: Historical	0.142	0.518	0.269	0.435	0.268	0.490	0.115	1.000	0.335	0.233	-0.036	-0.080	-0.096
Synthetic	0.020	0.400	0.293	0.349	0.247	0.388	0.172	1.000	0.190	0.114	-0.043	0.033	-0.013
9: Historical	-0.133	0.386	0.364	0.459	0.382	0.488	0.295	0.335	1.000	0.215	0.071	0.075	0.079
Synthetic	-0.011	0.389	0.362	0.411	0.308	0.418	0.338	0.190	1.000	0.123	0.102	0.096	0.154
10: Historical	0.001	0.528	0.469	0.511	0.564	0.477	0.662	0.233	0.215	1.000	0.425	0.421	0.450
Synthetic	-0.061	0.448	0.513	0.485	0.467	0.443	0.491	0.114	0.123	1.000	0.428	0.380	0.465
11: Historical	-0.175	0.418	0.462	0.395	0.428	0.301	0.486	-0.036	0.071	0.425	1.000	0.763	0.832
Synthetic	-0.138	0.383	0.436	0.389	0.343	0.318	0.370	-0.043	0.102	0.428	1.000	0.733	0.794
12: Historical	-0.011	0.248	0.411	0.331	0.472	0.247	0.599	-0.080	0.075	0.421	0.763	1.000	0.762
Synthetic	0.014	0.299	0.393	0.336	0.306	0.281	0.397	0.033	0.096	0.380	0.733	1.000	0.748
13: Historical	-0.130	0.357	0.459	0.403	0.476	0.316	0.587	-0.096	0.079	0.450	0.832	0.762	1.000
Synthetic	-0.087	0.441	0.506	0.470	0.424	0.414	0.486	-0.013	0.154	0.465	0.794	0.748	1.000

MARCH LAG 0 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.331	-0.284	-0.324	-0.306	-0.297	-0.219	-0.155	0.118	-0.239	-0.295	-0.227	-0.343
Synthetic	1.000	-0.221	-0.130	-0.198	-0.167	-0.180	-0.079	-0.017	0.092	-0.158	-0.181	-0.128	-0.203
2: Historical	-0.331	1.000	0.837	0.931	0.731	0.913	0.678	0.343	0.240	0.639	0.493	0.421	0.613
Synthetic	-0.221	1.000	0.837	0.915	0.697	0.891	0.707	0.314	0.284	0.476	0.373	0.315	0.407
3: Historical	-0.284	0.837	1.000	0.914	0.796	0.844	0.856	0.251	0.231	0.719	0.416	0.339	0.537
Synthetic	-0.130	0.837	1.000	0.896	0.701	0.844	0.746	0.238	0.396	0.494	0.393	0.344	0.421
4: Historical	-0.324	0.931	0.914	1.000	0.802	0.973	0.797	0.275	0.275	0.695	0.451	0.414	0.594
Synthetic	-0.198	0.915	0.896	1.000	0.735	0.959	0.754	0.288	0.344	0.507	0.400	0.357	0.428
5: Historical	-0.306	0.731	0.796	0.802	1.000	0.753	0.790	0.040	0.175	0.445	0.482	0.379	0.532
Synthetic	-0.167	0.697	0.701	0.735	1.000	0.715	0.771	0.103	0.212	0.532	0.524	0.476	0.516
6: Historical	-0.297	0.913	0.844	0.973	0.753	1.000	0.736	0.253	0.302	0.656	0.415	0.403	0.571
Synthetic	-0.180	0.891	0.844	0.959	0.715	1.000	0.732	0.305	0.331	0.492	0.362	0.336	0.385
7: Historical	-0.219	0.678	0.856	0.797	0.790	0.736	1.000	0.081	0.214	0.647	0.303	0.251	0.435
Synthetic	-0.079	0.707	0.746	0.754	0.771	0.732	1.000	0.182	0.371	0.616	0.391	0.316	0.428
8: Historical	-0.155	0.343	0.251	0.275	0.040	0.253	0.081	1.000	0.052	0.617	0.441	0.407	0.478
Synthetic	-0.017	0.314	0.238	0.288	0.103	0.305	0.182	1.000	0.084	0.170	0.038	0.037	0.025
9: Historical	0.118	0.240	0.231	0.275	0.175	0.302	0.214	0.052	1.000	0.167	0.085	0.072	0.033
Synthetic	0.092	0.284	0.396	0.344	0.212	0.331	0.371	0.084	1.000	0.357	0.180	0.127	0.155
10: Historical	-0.239	0.639	0.719	0.695	0.445	0.656	0.647	0.617	0.167	1.000	0.469	0.414	0.595
Synthetic	-0.158	0.476	0.494	0.507	0.532	0.492	0.616	0.170	0.357	1.000	0.400	0.337	0.395
11: Historical	-0.295	0.493	0.416	0.451	0.482	0.415	0.303	0.441	0.085	0.469	1.000	0.782	0.850
Synthetic	-0.181	0.373	0.393	0.400	0.524	0.362	0.391	0.038	0.180	0.400	1.000	0.809	0.863
12: Historical	-0.227	0.421	0.339	0.414	0.379	0.403	0.251	0.407	0.072	0.414	0.782	1.000	0.711
Synthetic	-0.128	0.315	0.344	0.357	0.476	0.336	0.316	0.037	0.127	0.337	0.809	1.000	0.715
13: Historical	-0.343	0.613	0.537	0.594	0.532	0.571	0.435	0.478	0.033	0.595	0.850	0.711	1.000
Synthetic	-0.203	0.407	0.421	0.428	0.516	0.385	0.428	0.025	0.155	0.395	0.863	0.715	1.000

APRIL LAG 0 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.572	-0.524	-0.562	-0.547	-0.545	-0.503	-0.135	-0.156	-0.497	-0.235	-0.174	-0.271
Synthetic	1.000	-0.358	-0.265	-0.292	-0.298	-0.256	-0.171	0.052	-0.058	-0.175	-0.280	-0.189	-0.293
2: Historical	-0.572	1.000	0.954	0.980	0.915	0.975	0.842	0.630	0.426	0.827	0.367	0.289	0.364
Synthetic	-0.358	1.000	0.860	0.913	0.717	0.891	0.644	0.187	0.191	0.256	0.359	0.237	0.391
3: Historical	-0.524	0.954	1.000	0.968	0.928	0.956	0.885	0.641	0.374	0.864	0.351	0.261	0.348
Synthetic	-0.265	0.860	1.000	0.903	0.745	0.856	0.656	0.183	0.143	0.301	0.330	0.248	0.388
4: Historical	-0.562	0.980	0.968	1.000	0.937	0.986	0.876	0.624	0.413	0.852	0.360	0.285	0.359
Synthetic	-0.292	0.913	0.903	1.000	0.738	0.958	0.700	0.193	0.127	0.272	0.332	0.234	0.385
5: Historical	-0.547	0.915	0.928	0.937	1.000	0.934	0.904	0.489	0.377	0.831	0.332	0.310	0.340
Synthetic	-0.298	0.717	0.745	0.738	1.000	0.713	0.704	0.118	0.106	0.333	0.350	0.302	0.414
6: Historical	-0.545	0.975	0.956	0.986	0.934	1.000	0.877	0.615	0.442	0.851	0.339	0.276	0.331
Synthetic	-0.256	0.891	0.856	0.958	0.713	1.000	0.697	0.213	0.135	0.259	0.306	0.209	0.357
7: Historical	-0.503	0.842	0.885	0.876	0.904	0.877	1.000	0.431	0.386	0.931	0.326	0.228	0.251
Synthetic	-0.171	0.644	0.656	0.700	0.704	0.697	1.000	0.107	0.070	0.298	0.263	0.214	0.290
8: Historical	-0.135	0.630	0.641	0.624	0.489	0.615	0.431	1.000	0.305	0.538	0.220	0.126	0.205
Synthetic	0.052	0.187	0.183	0.193	0.118	0.213	0.107	1.000	0.171	0.102	0.038	0.018	0.078
9: Historical	-0.156	0.426	0.374	0.413	0.377	0.442	0.386	0.305	1.000	0.377	-0.031	0.002	-0.059
Synthetic	-0.058	0.191	0.143	0.127	0.106	0.135	0.070	0.171	1.000	0.128	-0.015	-0.056	-0.047
10: Historical	-0.497	0.827	0.864	0.852	0.831	0.851	0.931	0.538	0.377	1.000	0.383	0.301	0.303
Synthetic	-0.175	0.256	0.301	0.272	0.333	0.259	0.298	0.102	0.128	1.000	0.302	0.249	0.297
11: Historical	-0.235	0.367	0.351	0.360	0.332	0.339	0.326	0.220	-0.031	0.383	1.000	0.783	0.861
Synthetic	-0.280	0.359	0.330	0.332	0.350	0.306	0.263	0.038	-0.015	0.302	1.000	0.810	0.903
12: Historical	-0.174	0.289	0.261	0.285	0.310	0.276	0.228	0.126	0.002	0.301	0.783	1.000	0.753
Synthetic	-0.189	0.237	0.248	0.234	0.302	0.209	0.214	0.018	-0.056	0.249	0.810	1.000	0.779
13: Historical	-0.271	0.364	0.348	0.359	0.340	0.331	0.251	0.205	-0.059	0.303	0.861	0.753	1.000
Synthetic	-0.293	0.391	0.388	0.385	0.414	0.357	0.290	0.078	-0.047	0.297	0.903	0.779	1.000

MAY LAG 0 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.523	-0.385	-0.445	-0.399	-0.404	-0.313	-0.022	0.064	-0.160	-0.362	-0.303	-0.282
Synthetic	1.000	-0.456	-0.376	-0.394	-0.395	-0.348	-0.308	0.099	0.057	-0.239	-0.350	-0.291	-0.317
2: Historical	-0.523	1.000	0.930	0.960	0.876	0.948	0.807	0.571	0.440	0.744	0.600	0.557	0.585
Synthetic	-0.456	1.000	0.864	0.922	0.769	0.900	0.698	0.058	0.172	0.467	0.547	0.468	0.504
3: Historical	-0.385	0.930	1.000	0.967	0.904	0.953	0.893	0.579	0.439	0.803	0.612	0.583	0.655
Synthetic	-0.376	0.864	1.000	0.920	0.826	0.883	0.783	0.079	0.151	0.475	0.535	0.471	0.524
4: Historical	-0.445	0.960	0.967	1.000	0.926	0.984	0.876	0.618	0.467	0.812	0.594	0.578	0.624
Synthetic	-0.394	0.922	0.920	1.000	0.845	0.965	0.774	0.091	0.149	0.470	0.542	0.475	0.529
5: Historical	-0.399	0.876	0.904	0.926	1.000	0.934	0.912	0.615	0.457	0.838	0.526	0.538	0.544
Synthetic	-0.395	0.769	0.826	0.845	1.000	0.827	0.835	0.037	0.132	0.493	0.496	0.452	0.483
6: Historical	-0.404	0.948	0.953	0.984	0.934	1.000	0.879	0.655	0.506	0.847	0.569	0.566	0.605
Synthetic	-0.348	0.900	0.883	0.965	0.827	1.000	0.763	0.104	0.146	0.465	0.510	0.452	0.501
7: Historical	-0.313	0.807	0.893	0.876	0.912	0.879	1.000	0.516	0.322	0.780	0.512	0.510	0.561
Synthetic	-0.308	0.698	0.783	0.774	0.835	0.763	1.000	0.052	0.122	0.510	0.434	0.400	0.424
8: Historical	-0.022	0.571	0.579	0.618	0.615	0.655	0.516	1.000	0.659	0.771	0.333	0.432	0.376
Synthetic	0.099	0.058	0.079	0.091	0.037	0.104	0.052	1.000	0.073	0.030	0.031	0.056	0.048
9: Historical	0.064	0.440	0.439	0.467	0.457	0.506	0.322	0.659	1.000	0.651	0.190	0.320	0.250
Synthetic	0.057	0.172	0.151	0.149	0.132	0.146	0.122	0.073	1.000	0.062	0.109	0.133	0.103
10: Historical	-0.160	0.744	0.803	0.812	0.838	0.847	0.780	0.771	0.651	1.000	0.449	0.513	0.524
Synthetic	-0.239	0.467	0.475	0.470	0.493	0.465	0.510	0.030	0.062	1.000	0.269	0.290	0.258
11: Historical	-0.362	0.600	0.612	0.594	0.526	0.569	0.512	0.333	0.190	0.449	1.000	0.862	0.895
Synthetic	-0.350	0.547	0.535	0.542	0.496	0.510	0.434	0.031	0.109	0.269	1.000	0.842	0.903
12: Historical	-0.303	0.557	0.583	0.578	0.538	0.566	0.510	0.432	0.320	0.513	0.862	1.000	0.800
Synthetic	-0.291	0.468	0.471	0.475	0.452	0.452	0.400	0.056	0.133	0.290	0.842	1.000	0.803
13: Historical	-0.282	0.585	0.655	0.624	0.544	0.605	0.561	0.376	0.250	0.524	0.895	0.800	1.000
Synthetic	-0.317	0.504	0.524	0.529	0.483	0.501	0.424	0.048	0.103	0.258	0.903	0.803	1.000

JUNE LAG 0 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.595	-0.531	-0.559	-0.531	-0.541	-0.440	-0.304	-0.111	-0.211	-0.171	-0.211	-0.223
Synthetic	1.000	-0.489	-0.446	-0.456	-0.500	-0.447	-0.415	-0.142	-0.091	-0.290	-0.118	-0.176	-0.184
2: Historical	-0.595	1.000	0.947	0.975	0.920	0.969	0.839	0.761	0.408	0.708	0.488	0.357	0.508
Synthetic	-0.489	1.000	0.905	0.934	0.829	0.917	0.827	0.340	0.143	0.612	0.364	0.306	0.368
3: Historical	-0.531	0.947	1.000	0.963	0.926	0.940	0.896	0.669	0.324	0.745	0.517	0.375	0.518
Synthetic	-0.446	0.905	1.000	0.927	0.828	0.894	0.849	0.300	0.104	0.591	0.369	0.333	0.372
4: Historical	-0.559	0.975	0.963	1.000	0.947	0.985	0.879	0.744	0.399	0.743	0.506	0.382	0.511
Synthetic	-0.456	0.934	0.927	1.000	0.868	0.968	0.863	0.375	0.135	0.640	0.371	0.335	0.364
5: Historical	-0.531	0.920	0.926	0.947	1.000	0.940	0.900	0.688	0.446	0.769	0.484	0.370	0.466
Synthetic	-0.500	0.829	0.828	0.868	1.000	0.856	0.878	0.324	0.157	0.644	0.358	0.344	0.340
6: Historical	-0.541	0.969	0.940	0.985	0.940	1.000	0.865	0.766	0.431	0.754	0.494	0.371	0.500
Synthetic	-0.447	0.917	0.894	0.968	0.856	1.000	0.853	0.395	0.137	0.645	0.358	0.322	0.350
7: Historical	-0.440	0.839	0.896	0.879	0.900	0.865	1.000	0.525	0.297	0.757	0.524	0.415	0.496
Synthetic	-0.415	0.827	0.849	0.863	0.878	0.853	1.000	0.263	0.128	0.656	0.361	0.356	0.349
8: Historical	-0.304	0.761	0.669	0.744	0.688	0.766	0.525	1.000	0.608	0.623	0.314	0.170	0.328
Synthetic	-0.142	0.340	0.300	0.375	0.324	0.395	0.263	1.000	0.166	0.267	0.179	0.126	0.160
9: Historical	-0.111	0.408	0.324	0.399	0.446	0.431	0.297	0.608	1.000	0.567	0.165	0.072	0.156
Synthetic	-0.091	0.143	0.104	0.135	0.157	0.137	0.128	0.166	1.000	0.147	0.127	0.109	0.132
10: Historical	-0.211	0.708	0.745	0.743	0.769	0.754	0.757	0.623	0.567	1.000	0.349	0.188	0.313
Synthetic	-0.290	0.612	0.591	0.640	0.644	0.645	0.656	0.267	0.147	1.000	0.290	0.304	0.269
11: Historical	-0.171	0.488	0.517	0.506	0.484	0.494	0.524	0.314	0.165	0.349	1.000	0.806	0.877
Synthetic	-0.118	0.364	0.369	0.371	0.358	0.358	0.361	0.179	0.127	0.290	1.000	0.823	0.886
12: Historical	-0.211	0.357	0.375	0.382	0.370	0.371	0.415	0.170	0.072	0.188	0.806	1.000	0.790
Synthetic	-0.176	0.306	0.333	0.335	0.344	0.322	0.356	0.126	0.109	0.304	0.823	1.000	0.816
13: Historical	-0.223	0.508	0.518	0.511	0.466	0.500	0.496	0.328	0.156	0.313	0.877	0.790	1.000
Synthetic	-0.184	0.368	0.372	0.364	0.340	0.350	0.349	0.160	0.132	0.269	0.886	0.816	1.000

JULY LAG 0 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.611	-0.584	-0.567	-0.481	-0.525	-0.473	-0.165	-0.107	-0.187	-0.364	-0.357	-0.344
Synthetic	1.000	-0.509	-0.493	-0.488	-0.446	-0.449	-0.410	-0.092	-0.043	-0.195	-0.261	-0.288	-0.266
2: Historical	-0.611	1.000	0.915	0.945	0.872	0.929	0.847	0.592	0.333	0.657	0.419	0.403	0.426
Synthetic	-0.509	1.000	0.913	0.946	0.844	0.931	0.846	0.444	0.167	0.611	0.450	0.413	0.463
3: Historical	-0.584	0.915	1.000	0.955	0.907	0.927	0.902	0.538	0.256	0.655	0.447	0.398	0.430
Synthetic	-0.493	0.913	1.000	0.941	0.871	0.911	0.889	0.400	0.123	0.628	0.481	0.410	0.471
4: Historical	-0.567	0.945	0.955	1.000	0.943	0.984	0.925	0.597	0.337	0.680	0.438	0.428	0.461
Synthetic	-0.488	0.946	0.941	1.000	0.899	0.967	0.901	0.437	0.148	0.655	0.467	0.432	0.487
5: Historical	-0.481	0.872	0.907	0.943	1.000	0.944	0.916	0.612	0.434	0.724	0.440	0.435	0.468
Synthetic	-0.446	0.844	0.871	0.899	1.000	0.891	0.884	0.377	0.187	0.665	0.475	0.458	0.491
6: Historical	-0.525	0.929	0.927	0.984	0.944	1.000	0.926	0.608	0.362	0.686	0.425	0.424	0.459
Synthetic	-0.449	0.931	0.911	0.967	0.891	1.000	0.897	0.445	0.150	0.668	0.443	0.415	0.471
7: Historical	-0.473	0.847	0.902	0.925	0.916	0.926	1.000	0.512	0.332	0.759	0.383	0.406	0.403
Synthetic	-0.410	0.846	0.889	0.901	0.884	0.897	1.000	0.354	0.112	0.725	0.435	0.418	0.453
8: Historical	-0.165	0.592	0.538	0.597	0.612	0.608	0.512	1.000	0.617	0.530	0.366	0.218	0.351
Synthetic	-0.092	0.444	0.400	0.437	0.377	0.445	0.354	1.000	0.154	0.311	0.270	0.182	0.248
9: Historical	-0.107	0.333	0.256	0.337	0.434	0.362	0.332	0.617	1.000	0.381	0.259	0.218	0.256
Synthetic	-0.043	0.167	0.123	0.148	0.187	0.150	0.112	0.154	1.000	0.130	0.174	0.140	0.185
10: Historical	-0.187	0.657	0.655	0.680	0.724	0.686	0.759	0.530	0.381	1.000	0.192	0.203	0.219
Synthetic	-0.195	0.611	0.628	0.655	0.665	0.668	0.725	0.311	0.130	1.000	0.303	0.310	0.331
11: Historical	-0.364	0.419	0.447	0.438	0.440	0.425	0.383	0.366	0.259	0.192	1.000	0.763	0.900
Synthetic	-0.261	0.450	0.481	0.467	0.475	0.443	0.435	0.270	0.174	0.303	1.000	0.762	0.901
12: Historical	-0.357	0.403	0.398	0.428	0.435	0.424	0.406	0.218	0.218	0.203	0.763	1.000	0.782
Synthetic	-0.288	0.413	0.410	0.432	0.458	0.415	0.418	0.182	0.140	0.310	0.762	1.000	0.778
13: Historical	-0.344	0.426	0.430	0.461	0.468	0.459	0.403	0.351	0.256	0.219	0.900	0.782	1.000
Synthetic	-0.266	0.463	0.471	0.487	0.491	0.471	0.453	0.248	0.185	0.331	0.901	0.778	1.000

AUGUST LAG 0 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.533	-0.540	-0.534	-0.459	-0.502	-0.497	-0.146	0.004	-0.270	-0.322	-0.338	-0.363
Synthetic	1.000	-0.372	-0.462	-0.377	-0.318	-0.342	-0.334	-0.025	-0.017	-0.262	-0.299	-0.293	-0.285
2: Historical	-0.533	1.000	0.930	0.974	0.877	0.967	0.916	0.629	0.249	0.763	0.536	0.511	0.604
Synthetic	-0.372	1.000	0.863	0.960	0.866	0.950	0.894	0.476	0.208	0.667	0.474	0.399	0.537
3: Historical	-0.540	0.930	1.000	0.951	0.850	0.918	0.882	0.591	0.238	0.727	0.529	0.498	0.610
Synthetic	-0.462	0.863	1.000	0.884	0.810	0.841	0.813	0.496	0.196	0.723	0.511	0.447	0.559
4: Historical	-0.534	0.974	0.951	1.000	0.905	0.983	0.937	0.624	0.232	0.778	0.553	0.546	0.626
Synthetic	-0.377	0.960	0.884	1.000	0.900	0.971	0.923	0.476	0.190	0.692	0.499	0.441	0.571
5: Historical	-0.459	0.877	0.850	0.905	1.000	0.903	0.898	0.566	0.244	0.776	0.586	0.580	0.581
Synthetic	-0.318	0.866	0.810	0.900	1.000	0.890	0.889	0.420	0.169	0.686	0.523	0.459	0.542
6: Historical	-0.502	0.967	0.918	0.983	0.903	1.000	0.938	0.625	0.228	0.786	0.536	0.546	0.607
Synthetic	-0.342	0.950	0.841	0.971	0.890	1.000	0.923	0.469	0.181	0.675	0.468	0.419	0.545
7: Historical	-0.497	0.916	0.882	0.937	0.898	0.938	1.000	0.530	0.212	0.785	0.539	0.526	0.611
Synthetic	-0.334	0.894	0.813	0.923	0.889	0.923	1.000	0.408	0.163	0.693	0.474	0.416	0.559
8: Historical	-0.146	0.629	0.591	0.624	0.566	0.625	0.530	1.000	0.383	0.607	0.295	0.298	0.324
Synthetic	-0.025	0.476	0.496	0.476	0.420	0.469	0.408	1.000	0.302	0.470	0.211	0.205	0.251
9: Historical	0.004	0.249	0.238	0.232	0.244	0.228	0.212	0.383	1.000	0.352	0.067	0.094	0.030
Synthetic	-0.017	0.208	0.196	0.190	0.169	0.181	0.163	0.302	1.000	0.260	0.103	0.123	0.043
10: Historical	-0.270	0.763	0.727	0.778	0.776	0.786	0.785	0.607	0.352	1.000	0.370	0.375	0.422
Synthetic	-0.262	0.667	0.723	0.692	0.686	0.675	0.693	0.470	0.260	1.000	0.383	0.357	0.395
11: Historical	-0.322	0.536	0.529	0.553	0.586	0.536	0.539	0.295	0.067	0.370	1.000	0.827	0.882
Synthetic	-0.299	0.474	0.511	0.499	0.523	0.468	0.474	0.211	0.103	0.383	1.000	0.818	0.867
12: Historical	-0.338	0.511	0.498	0.546	0.580	0.546	0.526	0.298	0.094	0.375	0.827	1.000	0.802
Synthetic	-0.293	0.399	0.447	0.441	0.459	0.419	0.416	0.205	0.123	0.357	0.818	1.000	0.794
13: Historical	-0.363	0.604	0.610	0.626	0.581	0.607	0.611	0.324	0.030	0.422	0.882	0.802	1.000
Synthetic	-0.285	0.537	0.559	0.571	0.542	0.545	0.559	0.251	0.043	0.395	0.867	0.794	1.000

SEPTEMBER LAG 0 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.312	-0.378	-0.335	-0.379	-0.256	-0.327	0.061	-0.006	-0.308	-0.274	-0.310	-0.333
Synthetic	1.000	-0.299	-0.400	-0.392	-0.406	-0.335	-0.372	-0.076	0.060	-0.275	-0.253	-0.294	-0.319
2: Historical	-0.312	1.000	0.906	0.959	0.868	0.943	0.870	0.693	0.268	0.791	0.571	0.521	0.538
Synthetic	-0.299	1.000	0.871	0.905	0.804	0.890	0.798	0.514	0.146	0.669	0.558	0.513	0.534
3: Historical	-0.378	0.906	1.000	0.941	0.887	0.901	0.878	0.609	0.298	0.797	0.496	0.476	0.467
Synthetic	-0.400	0.871	1.000	0.936	0.872	0.899	0.879	0.519	0.208	0.705	0.531	0.478	0.503
4: Historical	-0.335	0.959	0.941	1.000	0.907	0.979	0.915	0.684	0.263	0.812	0.556	0.503	0.531
Synthetic	-0.392	0.905	0.936	1.000	0.890	0.968	0.898	0.540	0.197	0.743	0.560	0.503	0.536
5: Historical	-0.379	0.868	0.887	0.907	1.000	0.882	0.879	0.550	0.241	0.790	0.569	0.574	0.567
Synthetic	-0.406	0.804	0.872	0.890	1.000	0.869	0.856	0.454	0.204	0.688	0.570	0.554	0.569
6: Historical	-0.256	0.943	0.901	0.979	0.882	1.000	0.899	0.713	0.245	0.796	0.549	0.478	0.522
Synthetic	-0.335	0.890	0.899	0.968	0.869	1.000	0.892	0.552	0.201	0.749	0.545	0.481	0.518
7: Historical	-0.327	0.870	0.878	0.915	0.879	0.899	1.000	0.555	0.223	0.803	0.579	0.517	0.546
Synthetic	-0.372	0.798	0.879	0.898	0.856	0.892	1.000	0.459	0.211	0.754	0.549	0.491	0.518
8: Historical	0.061	0.693	0.609	0.684	0.550	0.713	0.555	1.000	0.322	0.645	0.490	0.352	0.451
Synthetic	-0.076	0.514	0.519	0.540	0.454	0.552	0.459	1.000	0.253	0.571	0.334	0.257	0.304
9: Historical	-0.006	0.268	0.298	0.263	0.241	0.245	0.223	0.322	1.000	0.361	0.157	0.169	0.149
Synthetic	0.060	0.146	0.208	0.197	0.204	0.201	0.211	0.253	1.000	0.238	0.093	0.068	0.052
10: Historical	-0.308	0.791	0.797	0.812	0.790	0.796	0.803	0.645	0.361	1.000	0.481	0.465	0.489
Synthetic	-0.275	0.669	0.705	0.743	0.688	0.749	0.754	0.571	0.238	1.000	0.485	0.384	0.438
11: Historical	-0.274	0.571	0.496	0.556	0.569	0.549	0.579	0.490	0.157	0.481	1.000	0.780	0.907
Synthetic	-0.253	0.558	0.531	0.560	0.570	0.545	0.549	0.334	0.093	0.485	1.000	0.747	0.892
12: Historical	-0.310	0.521	0.476	0.503	0.574	0.478	0.517	0.352	0.169	0.465	0.780	1.000	0.829
Synthetic	-0.294	0.513	0.478	0.503	0.554	0.481	0.491	0.257	0.068	0.384	0.747	1.000	0.806
13: Historical	-0.333	0.538	0.467	0.531	0.567	0.522	0.546	0.451	0.149	0.489	0.907	0.829	1.000
Synthetic	-0.319	0.534	0.503	0.536	0.569	0.518	0.518	0.304	0.052	0.438	0.892	0.806	1.000

OCTOBER LAG 0 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.602	-0.666	-0.663	-0.676	-0.602	-0.575	-0.229	-0.002	-0.455	-0.349	-0.271	-0.309
Synthetic	1.000	-0.633	-0.670	-0.680	-0.657	-0.635	-0.569	-0.199	-0.067	-0.323	-0.345	-0.293	-0.341
2: Historical	-0.602	1.000	0.892	0.963	0.884	0.961	0.851	0.773	0.181	0.741	0.558	0.518	0.609
Synthetic	-0.633	1.000	0.863	0.895	0.827	0.880	0.824	0.523	0.306	0.530	0.513	0.461	0.559
3: Historical	-0.666	0.892	1.000	0.943	0.893	0.913	0.844	0.647	0.223	0.755	0.582	0.503	0.571
Synthetic	-0.670	0.863	1.000	0.935	0.870	0.908	0.822	0.495	0.331	0.631	0.593	0.526	0.625
4: Historical	-0.663	0.963	0.943	1.000	0.932	0.982	0.886	0.737	0.201	0.791	0.579	0.520	0.610
Synthetic	-0.680	0.895	0.935	1.000	0.911	0.970	0.811	0.508	0.334	0.644	0.562	0.507	0.608
5: Historical	-0.676	0.884	0.893	0.932	1.000	0.923	0.893	0.644	0.204	0.808	0.546	0.545	0.592
Synthetic	-0.657	0.827	0.870	0.911	1.000	0.902	0.821	0.480	0.351	0.633	0.516	0.516	0.588
6: Historical	-0.602	0.961	0.913	0.982	0.923	1.000	0.891	0.764	0.196	0.801	0.582	0.532	0.628
Synthetic	-0.635	0.880	0.908	0.970	0.902	1.000	0.813	0.522	0.348	0.660	0.553	0.501	0.606
7: Historical	-0.575	0.851	0.844	0.886	0.893	0.891	1.000	0.653	0.182	0.825	0.589	0.598	0.655
Synthetic	-0.569	0.824	0.822	0.811	0.821	0.813	1.000	0.490	0.292	0.634	0.508	0.491	0.570
8: Historical	-0.229	0.773	0.647	0.737	0.644	0.764	0.653	1.000	0.315	0.690	0.542	0.496	0.611
Synthetic	-0.199	0.523	0.495	0.508	0.480	0.522	0.490	1.000	0.331	0.417	0.390	0.306	0.434
9: Historical	-0.002	0.181	0.223	0.201	0.204	0.196	0.182	0.315	1.000	0.264	0.241	0.211	0.292
Synthetic	-0.067	0.306	0.331	0.334	0.351	0.348	0.292	0.331	1.000	0.358	0.283	0.293	0.357
10: Historical	-0.455	0.741	0.755	0.791	0.808	0.801	0.825	0.690	0.264	1.000	0.502	0.462	0.512
Synthetic	-0.323	0.530	0.631	0.644	0.633	0.660	0.634	0.417	0.358	1.000	0.410	0.372	0.420
11: Historical	-0.349	0.558	0.582	0.579	0.546	0.582	0.589	0.542	0.241	0.502	1.000	0.797	0.905
Synthetic	-0.345	0.513	0.593	0.562	0.516	0.553	0.508	0.390	0.283	0.410	1.000	0.803	0.885
12: Historical	-0.271	0.518	0.503	0.520	0.545	0.532	0.598	0.496	0.211	0.462	0.797	1.000	0.824
Synthetic	-0.293	0.461	0.526	0.507	0.516	0.501	0.491	0.306	0.293	0.372	0.803	1.000	0.814
13: Historical	-0.309	0.609	0.571	0.610	0.592	0.628	0.655	0.611	0.292	0.512	0.905	0.824	1.000
Synthetic	-0.341	0.559	0.625	0.608	0.588	0.606	0.570	0.434	0.357	0.420	0.885	0.814	1.000

NOVEMBER LAG 0 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.516	-0.512	-0.588	-0.640	-0.531	-0.399	-0.194	-0.074	-0.281	-0.343	-0.263	-0.280
Synthetic	1.000	-0.484	-0.504	-0.537	-0.582	-0.489	-0.443	-0.137	-0.049	-0.193	-0.318	-0.281	-0.267
2: Historical	-0.516	1.000	0.884	0.944	0.845	0.946	0.865	0.667	0.237	0.695	0.478	0.367	0.441
Synthetic	-0.484	1.000	0.895	0.940	0.854	0.941	0.868	0.397	0.241	0.508	0.449	0.327	0.435
3: Historical	-0.512	0.884	1.000	0.933	0.885	0.903	0.880	0.638	0.258	0.747	0.577	0.449	0.534
Synthetic	-0.504	0.895	1.000	0.930	0.888	0.909	0.898	0.418	0.292	0.553	0.485	0.393	0.496
4: Historical	-0.588	0.944	0.933	1.000	0.930	0.981	0.890	0.704	0.252	0.743	0.494	0.398	0.458
Synthetic	-0.537	0.940	0.930	1.000	0.918	0.972	0.888	0.441	0.274	0.543	0.463	0.348	0.451
5: Historical	-0.640	0.845	0.885	0.930	1.000	0.904	0.849	0.610	0.257	0.710	0.457	0.357	0.421
Synthetic	-0.582	0.854	0.888	0.918	1.000	0.898	0.864	0.389	0.260	0.535	0.439	0.339	0.429
6: Historical	-0.531	0.946	0.903	0.981	0.904	1.000	0.892	0.728	0.251	0.743	0.460	0.373	0.434
Synthetic	-0.489	0.941	0.909	0.972	0.898	1.000	0.885	0.463	0.282	0.541	0.448	0.333	0.439
7: Historical	-0.399	0.865	0.880	0.890	0.849	0.892	1.000	0.694	0.216	0.808	0.509	0.378	0.486
Synthetic	-0.443	0.868	0.898	0.888	0.864	0.885	1.000	0.420	0.314	0.601	0.481	0.343	0.485
8: Historical	-0.194	0.667	0.638	0.704	0.610	0.728	0.694	1.000	0.291	0.702	0.343	0.325	0.341
Synthetic	-0.137	0.397	0.418	0.441	0.389	0.463	0.420	1.000	0.252	0.310	0.237	0.215	0.244
9: Historical	-0.074	0.237	0.258	0.252	0.257	0.251	0.216	0.291	1.000	0.215	0.218	0.293	0.195
Synthetic	-0.049	0.241	0.292	0.274	0.260	0.282	0.314	0.252	1.000	0.331	0.205	0.148	0.201
10: Historical	-0.281	0.695	0.747	0.743	0.710	0.743	0.808	0.702	0.215	1.000	0.562	0.420	0.452
Synthetic	-0.193	0.508	0.553	0.543	0.535	0.541	0.601	0.310	0.331	1.000	0.432	0.297	0.371
11: Historical	-0.343	0.478	0.577	0.494	0.457	0.460	0.509	0.343	0.218	0.562	1.000	0.769	0.855
Synthetic	-0.318	0.449	0.485	0.463	0.439	0.448	0.481	0.237	0.205	0.432	1.000	0.709	0.843
12: Historical	-0.263	0.367	0.449	0.398	0.357	0.373	0.378	0.325	0.293	0.420	0.769	1.000	0.684
Synthetic	-0.281	0.327	0.393	0.348	0.339	0.333	0.343	0.215	0.148	0.297	0.709	1.000	0.673
13: Historical	-0.280	0.441	0.534	0.458	0.421	0.434	0.486	0.341	0.195	0.452	0.855	0.684	1.000
Synthetic	-0.267	0.435	0.496	0.451	0.429	0.439	0.485	0.244	0.201	0.371	0.843	0.673	1.000

DECEMBER LAG 0 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	1.000	-0.373	-0.307	-0.342	-0.283	-0.309	-0.257	-0.061	0.050	-0.227	-0.118	-0.140	-0.165
Synthetic	1.000	-0.425	-0.331	-0.354	-0.314	-0.340	-0.284	-0.083	0.056	-0.091	-0.157	-0.242	-0.145
2: Historical	-0.373	1.000	0.901	0.953	0.806	0.942	0.786	0.687	0.211	0.735	0.254	0.197	0.314
Synthetic	-0.425	1.000	0.870	0.922	0.826	0.921	0.813	0.427	0.226	0.470	0.303	0.251	0.312
3: Historical	-0.307	0.901	1.000	0.926	0.872	0.888	0.825	0.615	0.335	0.665	0.276	0.258	0.315
Synthetic	-0.331	0.870	1.000	0.917	0.862	0.886	0.836	0.430	0.305	0.510	0.295	0.234	0.296
4: Historical	-0.342	0.953	0.926	1.000	0.882	0.982	0.815	0.694	0.253	0.742	0.270	0.204	0.332
Synthetic	-0.354	0.922	0.917	1.000	0.900	0.970	0.859	0.436	0.295	0.557	0.304	0.213	0.330
5: Historical	-0.283	0.806	0.872	0.882	1.000	0.859	0.840	0.497	0.182	0.574	0.432	0.365	0.449
Synthetic	-0.314	0.826	0.862	0.900	1.000	0.888	0.828	0.353	0.252	0.551	0.338	0.258	0.346
6: Historical	-0.309	0.942	0.888	0.982	0.859	1.000	0.805	0.712	0.242	0.760	0.256	0.177	0.324
Synthetic	-0.340	0.921	0.886	0.970	0.888	1.000	0.851	0.455	0.301	0.548	0.276	0.195	0.309
7: Historical	-0.257	0.786	0.825	0.815	0.840	0.805	1.000	0.511	0.233	0.647	0.377	0.308	0.416
Synthetic	-0.284	0.813	0.836	0.859	0.828	0.851	1.000	0.326	0.279	0.613	0.320	0.233	0.340
8: Historical	-0.061	0.687	0.615	0.694	0.497	0.712	0.511	1.000	0.157	0.676	0.032	-0.104	0.065
Synthetic	-0.083	0.427	0.430	0.436	0.353	0.455	0.326	1.000	0.123	0.152	0.042	0.009	0.062
9: Historical	0.050	0.211	0.335	0.253	0.182	0.242	0.233	0.157	1.000	0.124	0.026	0.082	-0.044
Synthetic	0.056	0.226	0.305	0.295	0.252	0.301	0.279	0.123	1.000	0.191	0.043	-0.016	0.047
10: Historical	-0.227	0.735	0.665	0.742	0.574	0.760	0.647	0.676	0.124	1.000	0.231	0.127	0.193
Synthetic	-0.091	0.470	0.510	0.557	0.551	0.548	0.613	0.152	0.191	1.000	0.322	0.149	0.295
11: Historical	-0.118	0.254	0.276	0.270	0.432	0.256	0.377	0.032	0.026	0.231	1.000	0.766	0.844
Synthetic	-0.157	0.303	0.295	0.304	0.338	0.276	0.320	0.042	0.043	0.322	1.000	0.687	0.834
12: Historical	-0.140	0.197	0.258	0.204	0.365	0.177	0.308	-0.104	0.082	0.127	0.766	1.000	0.740
Synthetic	-0.242	0.251	0.234	0.213	0.258	0.195	0.233	0.009	-0.016	0.149	0.687	1.000	0.665
13: Historical	-0.165	0.314	0.315	0.332	0.449	0.324	0.416	0.065	-0.044	0.193	0.844	0.740	1.000
Synthetic	-0.145	0.312	0.296	0.330	0.346	0.309	0.340	0.062	0.047	0.295	0.834	0.665	1.000

JANUARY LAG 1 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.791	-0.084	-0.049	-0.036	-0.013	-0.015	-0.015	0.191	0.006	0.053	-0.091	-0.130	-0.106
Synthetic	0.721	-0.200	-0.172	-0.084	-0.112	-0.104	-0.106	0.026	0.052	0.034	-0.093	-0.208	-0.069
2: Historical	-0.405	0.573	0.550	0.575	0.499	0.564	0.491	0.249	0.344	0.262	0.304	0.249	0.282
Synthetic	-0.436	0.721	0.704	0.710	0.626	0.692	0.612	0.314	0.216	0.392	0.362	0.336	0.326
3: Historical	-0.274	0.520	0.621	0.577	0.544	0.551	0.482	0.262	0.407	0.258	0.286	0.250	0.248
Synthetic	-0.312	0.601	0.731	0.664	0.599	0.632	0.553	0.387	0.254	0.348	0.272	0.256	0.253
4: Historical	-0.297	0.569	0.574	0.610	0.544	0.605	0.474	0.290	0.360	0.301	0.313	0.242	0.300
Synthetic	-0.295	0.717	0.738	0.780	0.674	0.763	0.641	0.367	0.301	0.466	0.356	0.268	0.340
5: Historical	-0.303	0.509	0.548	0.558	0.598	0.544	0.492	0.218	0.244	0.246	0.375	0.326	0.345
Synthetic	-0.341	0.632	0.691	0.667	0.702	0.652	0.589	0.310	0.185	0.418	0.363	0.339	0.332
6: Historical	-0.271	0.568	0.543	0.601	0.526	0.605	0.465	0.300	0.345	0.310	0.300	0.219	0.293
Synthetic	-0.270	0.729	0.721	0.792	0.676	0.786	0.653	0.363	0.306	0.493	0.357	0.254	0.344
7: Historical	-0.295	0.654	0.690	0.688	0.705	0.678	0.710	0.337	0.293	0.382	0.410	0.355	0.397
Synthetic	-0.358	0.760	0.797	0.794	0.774	0.777	0.799	0.339	0.254	0.529	0.398	0.366	0.379
8: Historical	-0.133	0.380	0.334	0.312	0.205	0.291	0.201	0.234	0.189	0.182	0.036	0.065	0.006
Synthetic	-0.199	0.446	0.439	0.413	0.362	0.413	0.354	0.480	0.218	0.201	0.057	0.074	0.037
9: Historical	0.034	0.162	0.262	0.208	0.150	0.199	0.151	0.241	0.832	0.057	0.035	-0.001	-0.037
Synthetic	0.091	0.209	0.229	0.259	0.173	0.263	0.190	0.191	0.554	0.164	0.123	0.023	0.081
10: Historical	-0.241	0.569	0.539	0.532	0.445	0.520	0.548	0.277	0.259	0.515	0.392	0.369	0.349
Synthetic	-0.188	0.463	0.468	0.486	0.447	0.485	0.481	0.102	0.239	0.529	0.341	0.253	0.301
11: Historical	-0.053	0.126	0.098	0.107	0.041	0.114	0.080	0.170	0.183	-0.013	0.052	0.055	-0.026
Synthetic	-0.104	0.180	0.171	0.101	0.060	0.108	0.072	0.167	-0.002	0.008	0.099	0.200	0.042
12: Historical	-0.048	0.069	0.015	0.015	-0.060	0.019	-0.016	0.034	0.130	-0.052	0.031	0.107	-0.035
Synthetic	-0.099	0.161	0.158	0.079	0.017	0.070	0.058	0.121	-0.048	0.010	0.177	0.256	0.115
13: Historical	-0.074	0.108	0.091	0.087	0.051	0.092	0.052	0.060	0.177	-0.022	0.053	0.055	-0.062
Synthetic	-0.069	0.119	0.103	0.064	0.042	0.104	0.064	-0.004	0.095	0.060	0.122	0.170	0.058

FEBRUARY LAG 1 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.588	-0.223	-0.200	-0.218	-0.214	-0.195	-0.128	0.205	0.055	0.071	-0.193	-0.155	-0.158
Synthetic	0.681	-0.201	-0.179	-0.136	-0.183	-0.104	-0.149	0.044	0.093	-0.026	-0.226	-0.202	-0.175
2: Historical	-0.157	0.665	0.676	0.659	0.635	0.630	0.642	0.330	0.311	0.473	0.332	0.251	0.399
Synthetic	-0.149	0.653	0.692	0.705	0.611	0.684	0.659	0.334	0.376	0.507	0.290	0.244	0.282
3: Historical	-0.151	0.511	0.621	0.507	0.522	0.455	0.499	0.135	0.277	0.299	0.326	0.176	0.423
Synthetic	-0.149	0.543	0.630	0.551	0.494	0.535	0.513	0.212	0.307	0.373	0.321	0.249	0.260
4: Historical	-0.143	0.680	0.713	0.700	0.679	0.674	0.671	0.270	0.258	0.464	0.385	0.265	0.455
Synthetic	-0.122	0.627	0.686	0.695	0.597	0.686	0.630	0.281	0.350	0.494	0.290	0.238	0.288
5: Historical	-0.132	0.529	0.598	0.513	0.627	0.474	0.581	0.188	0.222	0.414	0.333	0.207	0.432
Synthetic	-0.143	0.568	0.603	0.582	0.700	0.568	0.616	0.186	0.292	0.520	0.322	0.239	0.306
6: Historical	-0.129	0.723	0.720	0.751	0.718	0.742	0.716	0.324	0.240	0.514	0.391	0.285	0.437
Synthetic	-0.115	0.658	0.704	0.742	0.633	0.743	0.670	0.315	0.354	0.522	0.279	0.229	0.279
7: Historical	-0.105	0.360	0.397	0.335	0.416	0.307	0.450	0.105	0.110	0.361	0.227	0.159	0.345
Synthetic	-0.147	0.442	0.468	0.460	0.466	0.459	0.592	0.118	0.261	0.462	0.225	0.182	0.328
8: Historical	-0.110	0.469	0.361	0.453	0.388	0.476	0.467	0.696	0.232	0.435	0.305	0.227	0.275
Synthetic	-0.194	0.512	0.510	0.481	0.459	0.472	0.454	0.733	0.155	0.237	0.335	0.268	0.108
9: Historical	-0.176	0.576	0.522	0.653	0.549	0.692	0.612	0.256	0.431	0.283	0.717	0.439	0.593
Synthetic	-0.062	0.296	0.330	0.355	0.242	0.355	0.314	0.217	0.583	0.254	0.184	0.074	0.254
10: Historical	-0.059	0.335	0.245	0.242	0.271	0.262	0.344	0.403	0.113	0.542	0.232	0.260	0.299
Synthetic	-0.024	0.225	0.286	0.226	0.293	0.242	0.284	0.053	0.108	0.353	0.182	0.224	0.110
11: Historical	-0.022	-0.021	0.017	-0.017	0.003	-0.026	0.044	-0.071	0.224	0.013	-0.008	0.034	0.079
Synthetic	0.027	0.035	0.056	0.027	0.043	0.018	0.079	-0.077	0.165	0.093	0.015	0.037	0.035
12: Historical	0.057	-0.041	-0.001	-0.030	0.017	-0.029	0.043	-0.067	0.129	0.022	-0.017	-0.016	0.048
Synthetic	0.127	0.007	0.032	0.005	0.015	0.025	0.100	-0.030	0.113	0.061	-0.013	-0.003	-0.034
13: Historical	-0.022	0.005	0.018	0.009	0.005	0.007	0.059	-0.072	0.086	0.061	0.045	0.056	0.089
Synthetic	0.007	0.136	0.130	0.136	0.114	0.141	0.194	-0.036	0.153	0.123	0.062	0.059	0.045

MARCH LAG 1 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.739	-0.052	-0.050	-0.032	0.006	-0.016	-0.041	0.203	-0.014	-0.027	-0.139	-0.020	-0.111
Synthetic	0.710	-0.036	-0.057	-0.036	0.008	-0.008	-0.056	0.076	0.039	-0.104	-0.055	0.068	-0.030
2: Historical	-0.108	0.556	0.560	0.560	0.469	0.529	0.456	0.146	0.140	0.491	0.348	0.372	0.358
Synthetic	-0.046	0.593	0.642	0.619	0.510	0.569	0.486	0.274	0.193	0.539	0.336	0.357	0.409
3: Historical	-0.136	0.428	0.626	0.495	0.478	0.408	0.517	-0.002	0.147	0.428	0.541	0.589	0.549
Synthetic	-0.062	0.538	0.719	0.605	0.484	0.540	0.500	0.197	0.217	0.572	0.442	0.455	0.508
4: Historical	-0.114	0.521	0.596	0.570	0.505	0.527	0.508	0.124	0.185	0.503	0.438	0.490	0.449
Synthetic	-0.048	0.575	0.662	0.651	0.507	0.594	0.519	0.231	0.223	0.555	0.382	0.398	0.445
5: Historical	-0.159	0.313	0.447	0.394	0.498	0.342	0.500	-0.039	0.104	0.334	0.407	0.523	0.467
Synthetic	-0.067	0.355	0.408	0.399	0.475	0.360	0.428	0.019	0.174	0.386	0.304	0.347	0.354
6: Historical	-0.093	0.533	0.564	0.579	0.496	0.559	0.479	0.185	0.212	0.509	0.359	0.428	0.373
Synthetic	-0.045	0.585	0.643	0.663	0.517	0.621	0.528	0.270	0.222	0.541	0.343	0.369	0.416
7: Historical	-0.107	0.357	0.523	0.448	0.532	0.372	0.697	-0.001	0.150	0.510	0.590	0.704	0.725
Synthetic	-0.030	0.489	0.551	0.540	0.482	0.489	0.643	0.122	0.289	0.474	0.429	0.499	0.539
8: Historical	-0.081	0.404	0.167	0.196	0.034	0.193	0.033	0.248	0.007	0.299	0.287	0.022	0.111
Synthetic	0.016	0.295	0.263	0.272	0.154	0.261	0.135	0.576	0.078	0.126	-0.038	0.004	0.011
9: Historical	0.075	0.420	0.388	0.502	0.427	0.540	0.355	0.326	0.768	0.317	0.150	0.211	0.152
Synthetic	0.019	0.407	0.450	0.445	0.336	0.448	0.427	0.106	0.424	0.369	0.269	0.321	0.323
10: Historical	-0.123	0.417	0.421	0.350	0.305	0.288	0.421	0.074	0.057	0.670	0.568	0.491	0.491
Synthetic	-0.083	0.373	0.336	0.360	0.373	0.333	0.476	0.077	0.184	0.523	0.339	0.318	0.375
11: Historical	-0.126	0.108	0.066	0.049	0.053	0.039	0.068	-0.093	-0.008	0.298	0.211	0.228	0.191
Synthetic	-0.078	0.023	0.052	0.014	0.095	0.016	0.117	-0.107	0.008	0.234	0.130	0.200	0.165
12: Historical	-0.038	0.116	0.076	0.069	0.064	0.070	0.048	0.012	0.052	0.268	0.155	0.182	0.148
Synthetic	-0.025	0.017	0.044	0.013	0.077	0.020	0.075	-0.064	0.050	0.261	0.098	0.183	0.125
13: Historical	-0.193	0.241	0.191	0.184	0.132	0.173	0.163	-0.091	-0.034	0.353	0.258	0.262	0.274
Synthetic	-0.109	0.090	0.126	0.087	0.132	0.082	0.148	-0.124	0.012	0.241	0.116	0.181	0.197

APRIL LAG 1 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.577	-0.276	-0.209	-0.326	-0.256	-0.365	-0.192	-0.163	-0.086	-0.375	-0.274	-0.235	-0.314
Synthetic	0.581	-0.176	-0.125	-0.188	-0.204	-0.216	-0.123	-0.027	0.013	-0.201	-0.183	-0.174	-0.176
2: Historical	-0.292	0.718	0.482	0.658	0.404	0.708	0.327	0.367	0.296	0.522	0.518	0.477	0.594
Synthetic	-0.230	0.743	0.668	0.717	0.526	0.704	0.512	0.277	0.253	0.396	0.404	0.418	0.408
3: Historical	-0.273	0.701	0.517	0.656	0.373	0.693	0.345	0.441	0.200	0.597	0.508	0.465	0.620
Synthetic	-0.189	0.670	0.729	0.697	0.472	0.666	0.515	0.277	0.288	0.369	0.360	0.366	0.384
4: Historical	-0.274	0.708	0.485	0.660	0.397	0.712	0.332	0.358	0.264	0.534	0.511	0.471	0.600
Synthetic	-0.182	0.728	0.702	0.738	0.534	0.730	0.546	0.263	0.275	0.404	0.391	0.412	0.407
5: Historical	-0.265	0.645	0.428	0.609	0.431	0.662	0.350	0.225	0.197	0.463	0.462	0.429	0.564
Synthetic	-0.225	0.608	0.574	0.601	0.599	0.600	0.526	0.145	0.153	0.470	0.441	0.403	0.466
6: Historical	-0.254	0.700	0.466	0.654	0.393	0.715	0.322	0.332	0.281	0.511	0.498	0.457	0.595
Synthetic	-0.160	0.724	0.686	0.741	0.552	0.746	0.552	0.260	0.273	0.411	0.387	0.406	0.414
7: Historical	-0.223	0.635	0.522	0.649	0.388	0.693	0.471	0.214	0.176	0.608	0.399	0.342	0.537
Synthetic	-0.130	0.570	0.532	0.586	0.576	0.584	0.694	0.147	0.238	0.517	0.417	0.365	0.454
8: Historical	-0.178	0.539	0.301	0.399	0.115	0.407	0.098	0.795	0.235	0.516	0.534	0.503	0.544
Synthetic	0.046	0.200	0.166	0.184	0.086	0.206	0.101	0.277	0.056	0.106	0.043	0.078	0.040
9: Historical	0.207	0.372	0.224	0.343	0.153	0.400	0.206	0.152	0.743	0.219	0.145	0.119	0.180
Synthetic	-0.038	0.320	0.339	0.272	0.098	0.291	0.149	0.195	0.368	0.154	0.085	0.072	0.098
10: Historical	-0.272	0.606	0.500	0.627	0.310	0.679	0.398	0.340	0.222	0.643	0.387	0.352	0.508
Synthetic	-0.141	0.312	0.315	0.304	0.239	0.317	0.250	0.190	0.089	0.321	0.236	0.250	0.243
11: Historical	-0.105	0.186	0.156	0.178	0.057	0.192	0.071	0.120	0.089	0.277	0.107	0.183	0.134
Synthetic	-0.101	0.145	0.078	0.097	0.063	0.129	0.102	0.154	-0.015	0.147	0.121	0.156	0.140
12: Historical	-0.030	0.019	-0.033	0.011	-0.021	0.042	-0.076	-0.033	0.155	0.039	0.054	0.096	0.011
Synthetic	-0.020	0.014	-0.023	-0.025	-0.006	0.015	0.013	0.083	-0.036	0.013	0.067	0.080	0.076
13: Historical	-0.127	0.116	0.074	0.115	0.031	0.135	0.003	0.108	0.095	0.183	0.148	0.252	0.154
Synthetic	-0.080	0.121	0.073	0.093	0.075	0.122	0.085	0.111	0.003	0.140	0.172	0.216	0.193

MAY LAG 1 CORRELATION COEFFICIENTS

(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.429	-0.171	-0.105	-0.152	-0.126	-0.136	-0.097	0.115	0.081	-0.132	-0.188	-0.243	-0.222
Synthetic	0.419	-0.161	-0.118	-0.112	-0.115	-0.077	-0.013	0.075	0.000	-0.090	-0.130	-0.149	-0.142
2: Historical	-0.444	0.730	0.655	0.715	0.651	0.710	0.558	0.391	0.294	0.598	0.382	0.412	0.377
Synthetic	-0.271	0.544	0.499	0.532	0.414	0.483	0.348	0.085	0.116	0.284	0.349	0.331	0.344
3: Historical	-0.362	0.708	0.665	0.705	0.644	0.705	0.567	0.424	0.264	0.631	0.382	0.458	0.366
Synthetic	-0.209	0.491	0.530	0.504	0.414	0.463	0.337	0.081	0.106	0.285	0.352	0.363	0.364
4: Historical	-0.406	0.739	0.680	0.734	0.675	0.736	0.596	0.428	0.304	0.652	0.384	0.445	0.378
Synthetic	-0.219	0.493	0.474	0.501	0.394	0.468	0.342	0.086	0.082	0.295	0.352	0.353	0.362
5: Historical	-0.431	0.730	0.659	0.725	0.675	0.732	0.621	0.421	0.330	0.685	0.415	0.505	0.409
Synthetic	-0.274	0.395	0.369	0.399	0.409	0.378	0.336	0.060	0.090	0.332	0.347	0.386	0.367
6: Historical	-0.424	0.774	0.712	0.770	0.714	0.774	0.637	0.456	0.337	0.693	0.391	0.450	0.388
Synthetic	-0.209	0.494	0.463	0.504	0.395	0.483	0.361	0.097	0.073	0.299	0.363	0.359	0.377
7: Historical	-0.312	0.597	0.539	0.593	0.554	0.599	0.512	0.376	0.233	0.597	0.429	0.499	0.417
Synthetic	-0.194	0.375	0.362	0.370	0.364	0.355	0.356	0.031	0.080	0.331	0.305	0.307	0.316
8: Historical	-0.314	0.755	0.730	0.761	0.704	0.776	0.654	0.653	0.427	0.690	0.169	0.217	0.132
Synthetic	0.020	0.068	0.048	0.066	0.032	0.078	0.045	0.152	0.051	0.070	0.105	0.133	0.093
9: Historical	-0.356	0.667	0.661	0.671	0.628	0.693	0.618	0.575	0.732	0.610	0.076	0.050	0.029
Synthetic	-0.007	0.178	0.142	0.170	0.119	0.171	0.135	0.079	0.368	0.105	0.140	0.082	0.120
10: Historical	-0.433	0.832	0.813	0.846	0.819	0.861	0.792	0.547	0.412	0.859	0.302	0.364	0.271
Synthetic	-0.163	0.243	0.229	0.251	0.254	0.237	0.151	0.006	0.127	0.386	0.203	0.184	0.189
11: Historical	-0.141	0.301	0.285	0.304	0.243	0.300	0.236	0.142	0.063	0.306	0.093	0.141	0.020
Synthetic	-0.107	0.115	0.129	0.126	0.057	0.097	0.068	-0.016	0.015	0.093	0.081	0.066	0.010
12: Historical	-0.181	0.375	0.375	0.385	0.327	0.388	0.350	0.282	0.119	0.406	0.052	0.058	-0.032
Synthetic	-0.109	0.091	0.091	0.092	0.049	0.090	0.065	0.015	0.015	0.114	0.019	-0.019	-0.055
13: Historical	-0.104	0.341	0.335	0.354	0.288	0.358	0.246	0.234	0.073	0.343	0.142	0.223	0.071
Synthetic	-0.085	0.095	0.113	0.111	0.050	0.094	0.066	-0.009	-0.008	0.121	0.138	0.127	0.077

JUNE LAG 1 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.596	-0.434	-0.372	-0.371	-0.288	-0.343	-0.242	0.016	-0.103	-0.113	-0.352	-0.351	-0.324
Synthetic	0.620	-0.406	-0.361	-0.372	-0.362	-0.359	-0.324	0.075	-0.035	-0.218	-0.312	-0.316	-0.287
2: Historical	-0.280	0.679	0.677	0.665	0.533	0.655	0.510	0.353	0.262	0.498	0.521	0.528	0.553
Synthetic	-0.328	0.675	0.671	0.655	0.583	0.633	0.511	0.017	0.116	0.461	0.434	0.441	0.419
3: Historical	-0.178	0.636	0.677	0.644	0.524	0.634	0.548	0.307	0.203	0.484	0.508	0.514	0.554
Synthetic	-0.283	0.594	0.673	0.608	0.540	0.589	0.488	0.015	0.073	0.433	0.447	0.451	0.453
4: Historical	-0.237	0.670	0.697	0.683	0.552	0.675	0.548	0.362	0.265	0.521	0.526	0.546	0.581
Synthetic	-0.288	0.640	0.686	0.679	0.604	0.667	0.545	0.039	0.104	0.474	0.453	0.471	0.470
5: Historical	-0.237	0.704	0.731	0.726	0.632	0.722	0.609	0.418	0.326	0.587	0.548	0.577	0.602
Synthetic	-0.328	0.598	0.660	0.642	0.665	0.616	0.562	0.058	0.124	0.477	0.467	0.490	0.497
6: Historical	-0.237	0.673	0.700	0.692	0.562	0.687	0.549	0.392	0.298	0.550	0.519	0.546	0.583
Synthetic	-0.280	0.644	0.671	0.683	0.611	0.678	0.550	0.046	0.107	0.480	0.442	0.465	0.459
7: Historical	-0.159	0.581	0.634	0.606	0.524	0.597	0.562	0.251	0.206	0.483	0.495	0.509	0.529
Synthetic	-0.290	0.568	0.637	0.583	0.609	0.553	0.565	0.008	0.110	0.501	0.428	0.423	0.430
8: Historical	-0.211	0.560	0.558	0.574	0.456	0.588	0.388	0.654	0.464	0.569	0.383	0.406	0.470
Synthetic	0.013	0.300	0.274	0.352	0.252	0.382	0.244	0.155	0.138	0.168	0.219	0.289	0.252
9: Historical	-0.142	0.538	0.513	0.550	0.520	0.587	0.385	0.730	0.844	0.727	0.290	0.417	0.332
Synthetic	-0.034	0.143	0.129	0.134	0.117	0.124	0.078	0.067	0.475	0.029	0.110	0.157	0.116
10: Historical	-0.087	0.719	0.798	0.775	0.719	0.791	0.726	0.611	0.490	0.852	0.493	0.512	0.600
Synthetic	-0.169	0.487	0.552	0.526	0.550	0.516	0.553	0.035	0.124	0.557	0.358	0.403	0.387
11: Historical	0.060	0.093	0.147	0.110	0.061	0.107	0.107	0.119	0.030	0.132	0.154	0.209	0.186
Synthetic	0.126	0.025	0.093	0.055	0.042	0.059	0.027	0.088	0.068	0.090	0.076	0.175	0.102
12: Historical	-0.028	0.021	0.065	0.036	0.009	0.023	0.032	0.039	-0.081	0.014	0.132	0.206	0.135
Synthetic	0.038	0.021	0.069	0.045	0.030	0.037	0.032	0.059	0.008	0.071	0.082	0.213	0.106
13: Historical	0.069	0.089	0.125	0.097	0.046	0.099	0.077	0.119	-0.003	0.116	0.122	0.170	0.134
Synthetic	0.128	0.034	0.086	0.050	0.024	0.062	0.027	0.063	0.029	0.049	0.054	0.145	0.070

JULY LAG 1 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.562	-0.296	-0.267	-0.267	-0.226	-0.253	-0.201	-0.155	-0.072	-0.107	-0.085	-0.174	-0.121
Synthetic	0.624	-0.317	-0.311	-0.281	-0.295	-0.276	-0.248	-0.016	-0.024	-0.168	-0.056	-0.167	-0.117
2: Historical	-0.441	0.670	0.662	0.669	0.659	0.662	0.586	0.420	0.309	0.578	0.296	0.250	0.315
Synthetic	-0.386	0.689	0.633	0.641	0.592	0.629	0.547	0.236	0.127	0.405	0.262	0.260	0.278
3: Historical	-0.382	0.587	0.613	0.588	0.579	0.575	0.529	0.349	0.229	0.539	0.317	0.250	0.343
Synthetic	-0.329	0.642	0.633	0.607	0.580	0.583	0.551	0.178	0.093	0.407	0.269	0.264	0.279
4: Historical	-0.383	0.641	0.632	0.640	0.635	0.637	0.566	0.407	0.325	0.567	0.328	0.259	0.351
Synthetic	-0.352	0.679	0.637	0.654	0.617	0.642	0.570	0.238	0.131	0.424	0.280	0.286	0.295
5: Historical	-0.372	0.648	0.636	0.657	0.697	0.661	0.586	0.446	0.435	0.626	0.343	0.253	0.351
Synthetic	-0.369	0.611	0.570	0.616	0.656	0.611	0.552	0.220	0.171	0.449	0.324	0.308	0.324
6: Historical	-0.371	0.653	0.632	0.651	0.647	0.652	0.570	0.429	0.361	0.578	0.332	0.253	0.354
Synthetic	-0.346	0.685	0.626	0.659	0.618	0.655	0.573	0.261	0.140	0.433	0.290	0.289	0.304
7: Historical	-0.343	0.663	0.649	0.662	0.677	0.662	0.630	0.411	0.350	0.636	0.391	0.321	0.409
Synthetic	-0.361	0.681	0.654	0.666	0.671	0.653	0.667	0.201	0.130	0.491	0.316	0.312	0.317
8: Historical	-0.284	0.527	0.485	0.533	0.535	0.556	0.395	0.676	0.649	0.583	0.173	0.066	0.177
Synthetic	-0.044	0.339	0.268	0.315	0.279	0.321	0.207	0.377	0.094	0.229	0.223	0.187	0.202
9: Historical	-0.268	0.391	0.294	0.366	0.410	0.394	0.264	0.492	0.881	0.476	0.173	0.059	0.160
Synthetic	-0.176	0.138	0.061	0.097	0.114	0.078	0.049	0.105	0.514	0.100	0.122	0.065	0.137
10: Historical	-0.306	0.765	0.798	0.793	0.813	0.793	0.826	0.547	0.430	0.910	0.442	0.311	0.388
Synthetic	-0.316	0.665	0.655	0.685	0.697	0.695	0.703	0.279	0.184	0.710	0.328	0.347	0.282
11: Historical	-0.185	0.123	0.116	0.120	0.148	0.125	0.087	0.071	0.169	0.135	0.198	0.222	0.154
Synthetic	-0.078	0.153	0.162	0.152	0.163	0.125	0.150	0.034	0.087	0.086	0.222	0.228	0.183
12: Historical	-0.076	0.112	0.127	0.121	0.189	0.120	0.123	-0.015	0.189	0.123	0.200	0.244	0.161
Synthetic	-0.066	0.114	0.143	0.131	0.159	0.108	0.122	0.027	0.130	0.060	0.214	0.246	0.170
13: Historical	-0.133	0.137	0.132	0.151	0.193	0.161	0.121	0.085	0.178	0.154	0.230	0.264	0.188
Synthetic	-0.071	0.155	0.172	0.169	0.191	0.146	0.157	0.052	0.091	0.086	0.258	0.287	0.221

AUGUST LAG 1 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

		1	2	3	4	5	6	7	8	9	10	11	12	13
1:	Historical	0.467	-0.287	-0.286	-0.267	-0.222	-0.251	-0.244	0.002	-0.058	-0.086	-0.231	-0.220	-0.254
	Synthetic	0.546	-0.302	-0.292	-0.297	-0.289	-0.287	-0.299	0.007	-0.033	-0.239	-0.111	-0.148	-0.142
2:	Historical	-0.379	0.678	0.633	0.702	0.675	0.719	0.709	0.288	0.228	0.513	0.410	0.476	0.445
	Synthetic	-0.316	0.716	0.699	0.722	0.668	0.716	0.702	0.327	0.091	0.529	0.482	0.400	0.465
3:	Historical	-0.349	0.576	0.549	0.595	0.578	0.607	0.616	0.249	0.185	0.470	0.349	0.410	0.370
	Synthetic	-0.320	0.648	0.649	0.677	0.678	0.677	0.661	0.308	0.075	0.554	0.428	0.378	0.405
4:	Historical	-0.383	0.659	0.621	0.690	0.676	0.708	0.701	0.284	0.205	0.516	0.385	0.456	0.430
	Synthetic	-0.325	0.697	0.690	0.719	0.685	0.718	0.711	0.297	0.058	0.543	0.458	0.387	0.456
5:	Historical	-0.352	0.648	0.603	0.668	0.709	0.683	0.673	0.254	0.227	0.521	0.315	0.381	0.370
	Synthetic	-0.289	0.652	0.654	0.683	0.715	0.678	0.687	0.237	0.072	0.532	0.420	0.353	0.422
6:	Historical	-0.386	0.670	0.637	0.713	0.706	0.734	0.724	0.301	0.212	0.528	0.393	0.462	0.443
	Synthetic	-0.332	0.694	0.689	0.718	0.683	0.718	0.713	0.293	0.050	0.538	0.453	0.377	0.454
7:	Historical	-0.320	0.619	0.590	0.660	0.668	0.679	0.701	0.249	0.209	0.484	0.413	0.501	0.470
	Synthetic	-0.305	0.625	0.637	0.660	0.658	0.658	0.705	0.237	0.052	0.530	0.469	0.422	0.477
8:	Historical	-0.319	0.555	0.480	0.526	0.506	0.536	0.511	0.569	0.303	0.515	0.289	0.238	0.273
	Synthetic	-0.075	0.421	0.387	0.431	0.415	0.456	0.371	0.454	0.123	0.367	0.293	0.196	0.274
9:	Historical	-0.222	0.333	0.262	0.333	0.408	0.355	0.338	0.546	0.891	0.358	0.222	0.191	0.223
	Synthetic	-0.081	0.216	0.183	0.207	0.245	0.209	0.172	0.192	0.648	0.220	0.201	0.131	0.190
10:	Historical	-0.225	0.647	0.623	0.684	0.737	0.703	0.781	0.426	0.383	0.853	0.303	0.366	0.339
	Synthetic	-0.241	0.602	0.596	0.642	0.695	0.657	0.694	0.303	0.130	0.830	0.344	0.345	0.358
11:	Historical	-0.132	0.291	0.218	0.270	0.244	0.280	0.238	-0.036	-0.031	0.154	0.128	0.179	0.146
	Synthetic	-0.094	0.240	0.225	0.246	0.268	0.241	0.249	0.102	-0.002	0.215	0.223	0.219	0.216
12:	Historical	-0.181	0.258	0.202	0.263	0.272	0.277	0.243	-0.016	0.005	0.142	0.155	0.224	0.185
	Synthetic	-0.145	0.193	0.190	0.224	0.289	0.230	0.228	0.063	-0.006	0.191	0.210	0.251	0.224
13:	Historical	-0.095	0.273	0.214	0.263	0.240	0.277	0.271	-0.035	-0.057	0.189	0.175	0.195	0.179
	Synthetic	-0.062	0.260	0.252	0.274	0.294	0.280	0.293	0.121	-0.068	0.213	0.259	0.219	0.248

SEPTEMBER LAG 1 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.280	-0.212	-0.265	-0.206	-0.201	-0.170	-0.244	0.129	-0.091	-0.203	-0.199	-0.164	-0.267
Synthetic	0.355	-0.170	-0.249	-0.157	-0.166	-0.128	-0.192	-0.034	-0.054	-0.223	-0.226	-0.221	-0.257
2: Historical	-0.309	0.726	0.605	0.701	0.702	0.715	0.671	0.482	0.327	0.671	0.515	0.601	0.547
Synthetic	-0.260	0.757	0.644	0.725	0.727	0.744	0.695	0.393	0.239	0.603	0.519	0.539	0.535
3: Historical	-0.229	0.611	0.543	0.598	0.603	0.596	0.577	0.445	0.311	0.636	0.471	0.554	0.493
Synthetic	-0.249	0.648	0.651	0.629	0.630	0.622	0.604	0.419	0.265	0.591	0.520	0.554	0.513
4: Historical	-0.313	0.706	0.615	0.700	0.697	0.710	0.665	0.472	0.298	0.672	0.542	0.625	0.566
Synthetic	-0.316	0.706	0.695	0.696	0.689	0.697	0.655	0.431	0.255	0.658	0.553	0.592	0.559
5: Historical	-0.269	0.601	0.523	0.603	0.700	0.612	0.599	0.349	0.258	0.633	0.498	0.584	0.471
Synthetic	-0.264	0.609	0.612	0.612	0.710	0.606	0.590	0.354	0.231	0.610	0.512	0.552	0.466
6: Historical	-0.310	0.714	0.624	0.718	0.707	0.732	0.674	0.492	0.275	0.671	0.550	0.633	0.571
Synthetic	-0.310	0.723	0.707	0.726	0.710	0.730	0.678	0.437	0.250	0.680	0.547	0.590	0.562
7: Historical	-0.242	0.634	0.560	0.631	0.653	0.632	0.647	0.385	0.300	0.627	0.553	0.601	0.549
Synthetic	-0.266	0.623	0.632	0.629	0.651	0.614	0.644	0.363	0.263	0.641	0.557	0.576	0.542
8: Historical	-0.192	0.579	0.512	0.590	0.572	0.612	0.531	0.687	0.303	0.552	0.292	0.316	0.303
Synthetic	-0.127	0.523	0.552	0.523	0.483	0.524	0.461	0.647	0.287	0.530	0.332	0.259	0.336
9: Historical	-0.028	0.162	0.140	0.144	0.143	0.147	0.144	0.341	0.802	0.283	-0.042	-0.010	-0.064
Synthetic	-0.012	0.180	0.203	0.178	0.184	0.157	0.149	0.315	0.595	0.267	0.160	0.137	0.086
10: Historical	-0.246	0.663	0.611	0.665	0.699	0.663	0.655	0.556	0.423	0.846	0.422	0.405	0.420
Synthetic	-0.271	0.617	0.653	0.627	0.638	0.617	0.613	0.469	0.294	0.832	0.470	0.439	0.430
11: Historical	-0.194	0.347	0.285	0.345	0.385	0.352	0.347	0.143	0.176	0.244	0.233	0.246	0.216
Synthetic	-0.151	0.323	0.316	0.307	0.370	0.305	0.316	0.190	0.183	0.323	0.220	0.218	0.182
12: Historical	-0.120	0.258	0.180	0.238	0.315	0.244	0.251	0.140	0.171	0.209	0.148	0.174	0.093
Synthetic	-0.110	0.252	0.214	0.234	0.305	0.232	0.229	0.172	0.135	0.224	0.146	0.179	0.085
13: Historical	-0.170	0.288	0.231	0.289	0.359	0.296	0.300	0.110	0.151	0.229	0.221	0.225	0.187
Synthetic	-0.128	0.267	0.242	0.256	0.341	0.255	0.269	0.150	0.107	0.269	0.221	0.214	0.162

OCTOBER LAG 1 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.526	-0.400	-0.420	-0.427	-0.439	-0.394	-0.413	-0.229	-0.040	-0.356	-0.309	-0.295	-0.275
Synthetic	0.475	-0.389	-0.387	-0.409	-0.404	-0.415	-0.417	-0.198	0.009	-0.285	-0.248	-0.255	-0.214
2: Historical	-0.150	0.751	0.705	0.743	0.709	0.737	0.673	0.624	0.132	0.643	0.468	0.468	0.397
Synthetic	-0.167	0.743	0.648	0.683	0.651	0.692	0.608	0.424	0.153	0.505	0.436	0.422	0.379
3: Historical	-0.245	0.670	0.733	0.709	0.686	0.690	0.650	0.529	0.156	0.682	0.378	0.406	0.310
Synthetic	-0.253	0.624	0.671	0.678	0.643	0.682	0.629	0.455	0.211	0.533	0.405	0.383	0.332
4: Historical	-0.199	0.733	0.733	0.757	0.733	0.751	0.702	0.604	0.151	0.687	0.466	0.456	0.390
Synthetic	-0.251	0.653	0.671	0.717	0.681	0.729	0.662	0.482	0.189	0.566	0.442	0.410	0.371
5: Historical	-0.243	0.692	0.700	0.717	0.775	0.706	0.666	0.523	0.149	0.660	0.471	0.460	0.409
Synthetic	-0.243	0.621	0.638	0.674	0.742	0.687	0.633	0.461	0.198	0.546	0.456	0.431	0.401
6: Historical	-0.161	0.734	0.728	0.758	0.741	0.754	0.710	0.614	0.151	0.687	0.483	0.469	0.406
Synthetic	-0.243	0.658	0.674	0.726	0.697	0.744	0.675	0.490	0.186	0.590	0.459	0.424	0.391
7: Historical	-0.134	0.682	0.674	0.700	0.740	0.692	0.715	0.504	0.166	0.610	0.514	0.515	0.443
Synthetic	-0.137	0.660	0.618	0.633	0.672	0.653	0.641	0.370	0.203	0.531	0.449	0.457	0.396
8: Historical	0.086	0.575	0.522	0.556	0.502	0.571	0.489	0.735	0.326	0.571	0.467	0.441	0.413
Synthetic	0.015	0.401	0.389	0.385	0.349	0.423	0.320	0.513	0.203	0.377	0.334	0.278	0.283
9: Historical	0.002	0.228	0.240	0.233	0.201	0.230	0.196	0.277	0.761	0.289	0.116	0.150	0.105
Synthetic	-0.071	0.359	0.387	0.387	0.428	0.376	0.320	0.360	0.500	0.338	0.310	0.265	0.265
10: Historical	-0.159	0.695	0.699	0.707	0.736	0.697	0.691	0.642	0.274	0.778	0.560	0.515	0.536
Synthetic	-0.193	0.558	0.599	0.624	0.623	0.622	0.601	0.524	0.267	0.748	0.452	0.398	0.417
11: Historical	-0.118	0.423	0.466	0.422	0.403	0.410	0.464	0.331	0.162	0.421	0.243	0.210	0.198
Synthetic	-0.158	0.324	0.384	0.332	0.323	0.322	0.362	0.252	0.193	0.277	0.236	0.193	0.197
12: Historical	-0.009	0.368	0.370	0.347	0.404	0.343	0.391	0.193	0.151	0.336	0.221	0.258	0.158
Synthetic	-0.096	0.255	0.305	0.272	0.334	0.267	0.302	0.173	0.214	0.218	0.211	0.246	0.169
13: Historical	-0.035	0.467	0.471	0.454	0.463	0.446	0.498	0.344	0.193	0.417	0.316	0.312	0.264
Synthetic	-0.129	0.375	0.420	0.388	0.405	0.390	0.410	0.284	0.246	0.308	0.310	0.305	0.260

NOVEMBER LAG 1 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.674	-0.258	-0.385	-0.338	-0.382	-0.277	-0.332	-0.035	-0.111	-0.235	-0.257	-0.260	-0.219
Synthetic	0.646	-0.323	-0.439	-0.412	-0.401	-0.390	-0.387	-0.128	-0.061	-0.226	-0.266	-0.263	-0.266
2: Historical	-0.524	0.659	0.621	0.669	0.622	0.658	0.608	0.509	0.123	0.514	0.559	0.514	0.593
Synthetic	-0.528	0.643	0.676	0.706	0.649	0.698	0.575	0.382	0.324	0.476	0.528	0.524	0.572
3: Historical	-0.513	0.618	0.655	0.654	0.594	0.633	0.589	0.519	0.147	0.524	0.531	0.468	0.528
Synthetic	-0.554	0.644	0.721	0.710	0.652	0.699	0.619	0.420	0.351	0.507	0.517	0.497	0.542
4: Historical	-0.601	0.708	0.699	0.742	0.700	0.726	0.682	0.591	0.156	0.599	0.574	0.516	0.596
Synthetic	-0.601	0.687	0.738	0.763	0.715	0.752	0.648	0.441	0.327	0.526	0.535	0.511	0.575
5: Historical	-0.665	0.698	0.715	0.747	0.768	0.725	0.718	0.543	0.156	0.631	0.517	0.528	0.537
Synthetic	-0.647	0.706	0.756	0.773	0.781	0.759	0.706	0.418	0.328	0.531	0.514	0.527	0.552
6: Historical	-0.565	0.715	0.688	0.745	0.704	0.737	0.691	0.613	0.153	0.603	0.589	0.521	0.621
Synthetic	-0.580	0.697	0.735	0.771	0.722	0.764	0.656	0.461	0.332	0.529	0.544	0.511	0.591
7: Historical	-0.452	0.685	0.688	0.718	0.687	0.721	0.744	0.584	0.155	0.604	0.631	0.625	0.687
Synthetic	-0.521	0.652	0.739	0.735	0.716	0.733	0.712	0.433	0.379	0.562	0.576	0.593	0.648
8: Historical	-0.215	0.621	0.557	0.617	0.552	0.633	0.564	0.769	0.308	0.542	0.473	0.450	0.574
Synthetic	-0.163	0.423	0.397	0.412	0.376	0.434	0.421	0.731	0.262	0.321	0.328	0.272	0.392
9: Historical	-0.087	0.116	0.184	0.164	0.157	0.174	0.187	0.275	0.556	0.276	0.164	0.107	0.203
Synthetic	-0.127	0.313	0.384	0.377	0.379	0.391	0.341	0.359	0.578	0.433	0.301	0.257	0.350
10: Historical	-0.272	0.527	0.541	0.571	0.571	0.580	0.593	0.518	0.228	0.620	0.541	0.488	0.576
Synthetic	-0.247	0.426	0.502	0.517	0.506	0.527	0.498	0.429	0.394	0.669	0.399	0.392	0.413
11: Historical	-0.184	0.180	0.246	0.226	0.219	0.212	0.230	0.120	0.102	0.253	0.111	0.081	0.121
Synthetic	-0.191	0.197	0.272	0.286	0.263	0.297	0.243	0.201	0.228	0.232	0.105	0.132	0.163
12: Historical	-0.144	0.227	0.249	0.246	0.221	0.232	0.216	0.194	0.176	0.257	0.074	0.065	0.079
Synthetic	-0.185	0.276	0.236	0.257	0.231	0.267	0.263	0.240	0.182	0.200	0.045	0.066	0.085
13: Historical	-0.148	0.165	0.229	0.209	0.182	0.204	0.203	0.126	0.047	0.199	0.081	0.047	0.122
Synthetic	-0.163	0.172	0.260	0.255	0.218	0.270	0.222	0.165	0.214	0.192	0.088	0.110	0.175

DECEMBER LAG 1 CORRELATION COEFFICIENTS
(generation using no lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.584	-0.150	-0.087	-0.125	-0.202	-0.099	-0.053	0.110	-0.133	-0.010	-0.330	-0.257	-0.294
Synthetic	0.509	-0.217	-0.186	-0.163	-0.258	-0.214	-0.212	-0.007	-0.006	-0.073	-0.274	-0.216	-0.266
2: Historical	-0.434	0.750	0.655	0.697	0.665	0.693	0.688	0.607	0.127	0.623	0.526	0.418	0.524
Synthetic	-0.438	0.757	0.682	0.689	0.696	0.704	0.698	0.376	0.254	0.469	0.513	0.441	0.515
3: Historical	-0.416	0.718	0.705	0.690	0.671	0.671	0.687	0.589	0.220	0.624	0.560	0.411	0.558
Synthetic	-0.412	0.733	0.737	0.686	0.695	0.688	0.693	0.406	0.298	0.506	0.503	0.463	0.531
4: Historical	-0.485	0.776	0.721	0.772	0.764	0.764	0.760	0.676	0.178	0.693	0.555	0.441	0.562
Synthetic	-0.483	0.775	0.737	0.761	0.771	0.753	0.750	0.439	0.284	0.533	0.543	0.461	0.548
5: Historical	-0.430	0.734	0.695	0.726	0.740	0.710	0.717	0.548	0.105	0.587	0.502	0.376	0.516
Synthetic	-0.410	0.717	0.693	0.692	0.750	0.695	0.701	0.364	0.256	0.500	0.463	0.381	0.469
6: Historical	-0.464	0.781	0.719	0.784	0.771	0.783	0.778	0.706	0.177	0.716	0.544	0.446	0.558
Synthetic	-0.467	0.776	0.732	0.770	0.776	0.768	0.761	0.451	0.297	0.548	0.553	0.461	0.551
7: Historical	-0.318	0.661	0.622	0.619	0.604	0.614	0.704	0.539	0.154	0.546	0.452	0.306	0.518
Synthetic	-0.398	0.710	0.701	0.671	0.685	0.672	0.768	0.358	0.280	0.541	0.466	0.378	0.493
8: Historical	-0.196	0.566	0.526	0.577	0.509	0.584	0.578	0.773	0.123	0.620	0.390	0.412	0.361
Synthetic	-0.173	0.426	0.451	0.452	0.432	0.468	0.429	0.691	0.238	0.368	0.259	0.310	0.257
9: Historical	-0.085	0.241	0.289	0.253	0.183	0.258	0.239	0.430	0.574	0.228	0.191	0.231	0.182
Synthetic	-0.026	0.224	0.233	0.245	0.205	0.223	0.229	0.237	0.499	0.225	0.253	0.185	0.262
10: Historical	-0.236	0.572	0.555	0.535	0.488	0.532	0.605	0.551	0.086	0.689	0.471	0.335	0.496
Synthetic	-0.242	0.429	0.421	0.428	0.421	0.399	0.475	0.233	0.198	0.534	0.402	0.318	0.372
11: Historical	0.000	0.176	0.113	0.102	0.092	0.103	0.198	0.053	-0.078	0.142	0.162	0.135	0.202
Synthetic	-0.052	0.110	0.061	0.051	0.070	0.024	0.106	0.020	0.020	0.068	0.141	0.138	0.174
12: Historical	0.045	0.030	-0.007	-0.036	-0.012	-0.041	0.056	-0.091	-0.015	0.038	0.106	0.008	0.121
Synthetic	0.000	0.020	-0.024	-0.064	0.006	-0.054	0.022	-0.043	-0.011	0.021	0.076	0.049	0.077
13: Historical	-0.109	0.170	0.103	0.133	0.168	0.133	0.243	0.045	-0.092	0.109	0.084	0.028	0.084
Synthetic	-0.092	0.099	0.069	0.067	0.119	0.039	0.144	0.030	0.018	0.062	0.112	0.077	0.109

JANUARY LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.791	-0.084	-0.049	-0.036	-0.013	-0.015	-0.015	0.191	0.006	0.053	-0.091	-0.130	-0.106
Synthetic	0.684	-0.136	-0.093	-0.027	0.016	-0.048	-0.030	-0.008	0.044	0.091	-0.126	-0.234	-0.074
2: Historical	-0.405	0.573	0.550	0.575	0.499	0.564	0.491	0.249	0.344	0.262	0.304	0.249	0.282
Synthetic	-0.428	0.663	0.654	0.665	0.563	0.642	0.554	0.284	0.220	0.305	0.343	0.324	0.308
3: Historical	-0.274	0.520	0.621	0.577	0.544	0.551	0.482	0.262	0.407	0.258	0.286	0.250	0.248
Synthetic	-0.328	0.566	0.698	0.635	0.562	0.606	0.520	0.344	0.261	0.307	0.253	0.267	0.231
4: Historical	-0.297	0.569	0.574	0.610	0.544	0.605	0.474	0.290	0.360	0.301	0.313	0.242	0.300
Synthetic	-0.300	0.672	0.719	0.747	0.644	0.723	0.604	0.311	0.304	0.408	0.328	0.259	0.318
5: Historical	-0.303	0.509	0.548	0.558	0.598	0.544	0.492	0.218	0.244	0.246	0.375	0.326	0.345
Synthetic	-0.319	0.582	0.663	0.638	0.657	0.620	0.546	0.260	0.202	0.380	0.347	0.318	0.302
6: Historical	-0.271	0.568	0.543	0.601	0.526	0.605	0.465	0.300	0.345	0.310	0.300	0.219	0.293
Synthetic	-0.265	0.682	0.707	0.762	0.654	0.747	0.619	0.306	0.312	0.436	0.328	0.235	0.324
7: Historical	-0.295	0.654	0.690	0.688	0.705	0.678	0.710	0.337	0.293	0.382	0.410	0.355	0.397
Synthetic	-0.352	0.729	0.784	0.779	0.737	0.750	0.784	0.294	0.265	0.487	0.372	0.341	0.358
8: Historical	-0.133	0.380	0.334	0.312	0.205	0.291	0.201	0.234	0.189	0.182	0.036	0.065	0.006
Synthetic	-0.162	0.387	0.369	0.356	0.281	0.355	0.275	0.473	0.197	0.124	0.044	0.064	0.020
9: Historical	0.034	0.162	0.262	0.208	0.150	0.199	0.151	0.241	0.832	0.057	0.035	-0.001	-0.037
Synthetic	0.085	0.189	0.235	0.256	0.192	0.246	0.213	0.147	0.567	0.170	0.120	0.017	0.085
10: Historical	-0.241	0.569	0.539	0.532	0.445	0.520	0.548	0.277	0.259	0.515	0.392	0.369	0.349
Synthetic	-0.179	0.424	0.473	0.473	0.452	0.460	0.489	0.039	0.269	0.538	0.304	0.207	0.268
11: Historical	-0.053	0.126	0.098	0.107	0.041	0.114	0.080	0.170	0.183	-0.013	0.052	0.055	-0.026
Synthetic	-0.107	0.138	0.104	0.054	-0.032	0.052	0.011	0.176	-0.016	-0.072	0.089	0.220	0.043
12: Historical	-0.048	0.069	0.015	0.015	-0.060	0.019	-0.016	0.034	0.130	-0.052	0.031	0.107	-0.035
Synthetic	-0.115	0.126	0.097	0.038	-0.069	0.019	0.008	0.153	-0.062	-0.072	0.152	0.263	0.118
13: Historical	-0.074	0.108	0.091	0.087	0.051	0.092	0.052	0.060	0.177	-0.022	0.053	0.055	-0.062
Synthetic	-0.079	0.079	0.068	0.036	-0.015	0.057	0.036	-0.010	0.097	0.031	0.129	0.188	0.066

FEBRUARY LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

		1	2	3	4	5	6	7	8	9	10	11	12	13
1:	Historical	0.588	-0.223	-0.200	-0.218	-0.214	-0.195	-0.128	0.205	0.055	0.071	-0.193	-0.155	-0.158
	Synthetic	0.666	-0.170	-0.168	-0.104	-0.112	-0.062	-0.090	0.088	0.103	0.021	-0.232	-0.189	-0.186
2:	Historical	-0.157	0.665	0.676	0.659	0.635	0.630	0.642	0.330	0.311	0.473	0.332	0.251	0.399
	Synthetic	-0.157	0.632	0.663	0.683	0.607	0.663	0.646	0.309	0.377	0.500	0.245	0.184	0.311
3:	Historical	-0.151	0.511	0.621	0.507	0.522	0.455	0.499	0.135	0.277	0.299	0.326	0.176	0.423
	Synthetic	-0.149	0.541	0.616	0.548	0.524	0.535	0.513	0.176	0.319	0.385	0.294	0.196	0.292
4:	Historical	-0.143	0.680	0.713	0.700	0.679	0.674	0.671	0.270	0.258	0.464	0.385	0.265	0.455
	Synthetic	-0.129	0.612	0.662	0.680	0.606	0.675	0.615	0.255	0.358	0.495	0.252	0.175	0.316
5:	Historical	-0.132	0.529	0.598	0.513	0.627	0.474	0.581	0.188	0.222	0.414	0.333	0.207	0.432
	Synthetic	-0.111	0.509	0.523	0.523	0.625	0.525	0.555	0.125	0.288	0.481	0.253	0.140	0.300
6:	Historical	-0.129	0.723	0.720	0.751	0.718	0.742	0.716	0.324	0.240	0.514	0.391	0.285	0.437
	Synthetic	-0.130	0.638	0.677	0.725	0.633	0.729	0.647	0.299	0.357	0.511	0.245	0.172	0.309
7:	Historical	-0.105	0.360	0.397	0.335	0.416	0.307	0.450	0.105	0.110	0.361	0.227	0.159	0.345
	Synthetic	-0.131	0.434	0.474	0.464	0.473	0.469	0.614	0.102	0.262	0.491	0.180	0.142	0.320
8:	Historical	-0.110	0.469	0.361	0.453	0.388	0.476	0.467	0.696	0.232	0.435	0.305	0.227	0.275
	Synthetic	-0.214	0.484	0.475	0.454	0.421	0.447	0.406	0.736	0.167	0.174	0.328	0.272	0.113
9:	Historical	-0.176	0.576	0.522	0.653	0.549	0.692	0.612	0.256	0.431	0.283	0.717	0.439	0.593
	Synthetic	-0.070	0.321	0.370	0.387	0.294	0.381	0.349	0.254	0.599	0.274	0.197	0.087	0.245
10:	Historical	-0.059	0.335	0.245	0.242	0.271	0.262	0.344	0.403	0.113	0.542	0.232	0.260	0.299
	Synthetic	0.015	0.181	0.230	0.184	0.237	0.200	0.246	0.007	0.114	0.338	0.141	0.173	0.132
11:	Historical	-0.022	-0.021	0.017	-0.017	0.003	-0.026	0.044	-0.071	0.224	0.013	-0.008	0.034	0.079
	Synthetic	-0.036	0.057	0.073	0.026	0.052	0.015	0.100	-0.066	0.152	0.089	0.048	0.065	0.062
12:	Historical	0.057	-0.041	-0.001	-0.030	0.017	-0.029	0.043	-0.067	0.129	0.022	-0.017	-0.016	0.048
	Synthetic	0.045	0.038	0.057	0.012	0.032	0.027	0.133	-0.003	0.112	0.064	0.041	0.055	-0.008
13:	Historical	-0.022	0.005	0.018	0.009	0.005	0.007	0.059	-0.072	0.086	0.061	0.045	0.056	0.089
	Synthetic	-0.030	0.140	0.124	0.120	0.111	0.125	0.201	-0.028	0.153	0.110	0.084	0.077	0.069

MARCH LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.739	-0.052	-0.050	-0.032	0.006	-0.016	-0.041	0.203	-0.014	-0.027	-0.139	-0.020	-0.111
Synthetic	0.680	0.040	0.033	0.046	0.060	0.069	0.006	0.127	0.084	-0.063	-0.080	0.072	-0.027
2: Historical	-0.108	0.556	0.560	0.560	0.469	0.529	0.456	0.146	0.140	0.491	0.348	0.372	0.358
Synthetic	-0.024	0.557	0.587	0.575	0.503	0.534	0.486	0.251	0.190	0.507	0.321	0.320	0.368
3: Historical	-0.136	0.428	0.626	0.495	0.478	0.408	0.517	-0.002	0.147	0.428	0.541	0.589	0.549
Synthetic	-0.047	0.515	0.684	0.580	0.500	0.528	0.509	0.193	0.216	0.569	0.429	0.421	0.468
4: Historical	-0.114	0.521	0.596	0.570	0.505	0.527	0.508	0.124	0.185	0.503	0.438	0.490	0.449
Synthetic	-0.017	0.541	0.622	0.616	0.509	0.572	0.516	0.225	0.222	0.542	0.363	0.360	0.399
5: Historical	-0.159	0.313	0.447	0.394	0.498	0.342	0.500	-0.039	0.104	0.334	0.407	0.523	0.467
Synthetic	-0.015	0.286	0.356	0.326	0.419	0.313	0.391	0.037	0.141	0.337	0.260	0.304	0.288
6: Historical	-0.093	0.533	0.564	0.579	0.496	0.559	0.479	0.185	0.212	0.509	0.359	0.428	0.373
Synthetic	-0.010	0.546	0.603	0.624	0.507	0.597	0.517	0.270	0.221	0.517	0.323	0.335	0.368
7: Historical	-0.107	0.357	0.523	0.448	0.532	0.372	0.697	-0.001	0.150	0.510	0.590	0.704	0.725
Synthetic	0.007	0.466	0.535	0.512	0.473	0.478	0.641	0.157	0.292	0.462	0.410	0.478	0.494
8: Historical	-0.081	0.404	0.167	0.196	0.034	0.193	0.033	0.248	0.007	0.299	0.287	0.022	0.111
Synthetic	0.052	0.309	0.238	0.278	0.156	0.270	0.177	0.570	0.117	0.107	-0.023	0.000	0.010
9: Historical	0.075	0.420	0.388	0.502	0.427	0.540	0.355	0.326	0.768	0.317	0.150	0.211	0.152
Synthetic	0.027	0.441	0.488	0.490	0.370	0.487	0.461	0.093	0.481	0.385	0.276	0.322	0.323
10: Historical	-0.123	0.417	0.421	0.350	0.305	0.288	0.421	0.074	0.057	0.670	0.568	0.491	0.491
Synthetic	-0.077	0.359	0.326	0.337	0.324	0.321	0.483	0.075	0.206	0.514	0.330	0.297	0.343
11: Historical	-0.126	0.108	0.066	0.049	0.053	0.039	0.068	-0.093	-0.008	0.298	0.211	0.228	0.191
Synthetic	-0.023	-0.008	0.045	-0.012	0.059	-0.005	0.094	-0.094	0.009	0.230	0.128	0.205	0.144
12: Historical	-0.038	0.116	0.076	0.069	0.064	0.070	0.048	0.012	0.052	0.268	0.155	0.182	0.148
Synthetic	0.043	-0.043	0.006	-0.047	0.015	-0.025	0.017	-0.025	0.030	0.221	0.052	0.143	0.056
13: Historical	-0.193	0.241	0.191	0.184	0.132	0.173	0.163	-0.091	-0.034	0.353	0.258	0.262	0.274
Synthetic	-0.054	0.036	0.098	0.037	0.091	0.039	0.113	-0.133	-0.003	0.232	0.109	0.168	0.170

APRIL LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.577	-0.276	-0.209	-0.326	-0.256	-0.365	-0.192	-0.163	-0.086	-0.375	-0.274	-0.235	-0.314
Synthetic	0.579	-0.159	-0.109	-0.154	-0.159	-0.185	-0.059	0.005	0.059	-0.172	-0.142	-0.142	-0.143
2: Historical	-0.292	0.718	0.482	0.658	0.404	0.708	0.327	0.367	0.296	0.522	0.518	0.477	0.594
Synthetic	-0.215	0.736	0.646	0.695	0.509	0.685	0.489	0.246	0.220	0.370	0.389	0.377	0.377
3: Historical	-0.273	0.701	0.517	0.656	0.373	0.693	0.345	0.441	0.200	0.597	0.508	0.465	0.620
Synthetic	-0.172	0.666	0.716	0.692	0.480	0.663	0.519	0.240	0.261	0.379	0.363	0.345	0.372
4: Historical	-0.274	0.708	0.485	0.660	0.397	0.712	0.332	0.358	0.264	0.534	0.511	0.471	0.600
Synthetic	-0.145	0.724	0.687	0.727	0.528	0.717	0.534	0.238	0.250	0.390	0.383	0.377	0.379
5: Historical	-0.265	0.645	0.428	0.609	0.431	0.662	0.350	0.225	0.197	0.463	0.462	0.429	0.564
Synthetic	-0.222	0.566	0.537	0.555	0.580	0.550	0.511	0.128	0.136	0.433	0.427	0.341	0.436
6: Historical	-0.254	0.700	0.466	0.654	0.393	0.715	0.322	0.332	0.281	0.511	0.498	0.457	0.595
Synthetic	-0.116	0.722	0.673	0.727	0.539	0.729	0.540	0.245	0.255	0.393	0.376	0.362	0.378
7: Historical	-0.223	0.635	0.522	0.649	0.388	0.693	0.471	0.214	0.176	0.608	0.399	0.342	0.537
Synthetic	-0.092	0.578	0.548	0.580	0.578	0.580	0.705	0.144	0.247	0.521	0.405	0.326	0.418
8: Historical	-0.178	0.539	0.301	0.399	0.115	0.407	0.098	0.795	0.235	0.516	0.534	0.503	0.544
Synthetic	0.053	0.184	0.186	0.194	0.088	0.207	0.137	0.290	0.096	0.123	0.052	0.089	0.059
9: Historical	0.207	0.372	0.224	0.343	0.153	0.400	0.206	0.152	0.743	0.219	0.145	0.119	0.180
Synthetic	-0.014	0.279	0.301	0.249	0.069	0.269	0.153	0.198	0.384	0.145	0.079	0.048	0.085
10: Historical	-0.272	0.606	0.500	0.627	0.310	0.679	0.398	0.340	0.222	0.643	0.387	0.352	0.508
Synthetic	-0.155	0.220	0.252	0.230	0.195	0.229	0.216	0.146	0.074	0.291	0.254	0.244	0.252
11: Historical	-0.105	0.186	0.156	0.178	0.057	0.192	0.071	0.120	0.089	0.277	0.107	0.183	0.134
Synthetic	-0.165	0.096	0.024	0.032	0.033	0.066	0.050	0.119	-0.081	0.103	0.097	0.126	0.134
12: Historical	-0.030	0.019	-0.033	0.011	-0.021	0.042	-0.076	-0.033	0.155	0.039	0.054	0.096	0.011
Synthetic	-0.056	-0.009	-0.042	-0.047	-0.006	0.000	0.008	0.062	-0.058	0.004	0.047	0.073	0.063
13: Historical	-0.127	0.116	0.074	0.115	0.031	0.135	0.003	0.108	0.095	0.183	0.148	0.252	0.154
Synthetic	-0.151	0.092	0.043	0.047	0.056	0.075	0.058	0.081	-0.043	0.115	0.154	0.184	0.193

MAY LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.429	-0.171	-0.105	-0.152	-0.126	-0.136	-0.097	0.115	0.081	-0.132	-0.188	-0.243	-0.222
Synthetic	0.416	-0.178	-0.131	-0.117	-0.117	-0.083	-0.007	0.085	0.025	-0.071	-0.161	-0.173	-0.176
2: Historical	-0.444	0.730	0.655	0.715	0.651	0.710	0.558	0.391	0.294	0.598	0.382	0.412	0.377
Synthetic	-0.252	0.563	0.489	0.534	0.381	0.493	0.344	0.101	0.115	0.198	0.312	0.323	0.318
3: Historical	-0.362	0.708	0.665	0.705	0.644	0.705	0.567	0.424	0.264	0.631	0.382	0.458	0.366
Synthetic	-0.192	0.508	0.513	0.495	0.394	0.464	0.337	0.105	0.103	0.226	0.330	0.372	0.344
4: Historical	-0.406	0.739	0.680	0.734	0.675	0.736	0.596	0.428	0.304	0.652	0.384	0.445	0.378
Synthetic	-0.206	0.516	0.459	0.497	0.363	0.469	0.332	0.104	0.091	0.219	0.323	0.354	0.332
5: Historical	-0.431	0.730	0.659	0.725	0.675	0.732	0.621	0.421	0.330	0.685	0.415	0.505	0.409
Synthetic	-0.258	0.418	0.366	0.389	0.397	0.368	0.335	0.072	0.106	0.280	0.343	0.398	0.359
6: Historical	-0.424	0.774	0.712	0.770	0.714	0.774	0.637	0.456	0.337	0.693	0.391	0.450	0.388
Synthetic	-0.201	0.517	0.448	0.500	0.360	0.479	0.343	0.111	0.092	0.216	0.331	0.356	0.343
7: Historical	-0.312	0.597	0.539	0.593	0.554	0.599	0.512	0.376	0.233	0.597	0.429	0.499	0.417
Synthetic	-0.175	0.391	0.355	0.365	0.360	0.355	0.358	0.047	0.084	0.285	0.299	0.321	0.308
8: Historical	-0.314	0.755	0.730	0.761	0.704	0.776	0.654	0.653	0.427	0.690	0.169	0.217	0.132
Synthetic	-0.002	0.054	0.025	0.046	0.014	0.058	0.013	0.126	0.047	0.049	0.110	0.125	0.086
9: Historical	-0.356	0.667	0.661	0.671	0.628	0.693	0.618	0.575	0.732	0.610	0.076	0.050	0.029
Synthetic	-0.004	0.199	0.136	0.167	0.110	0.174	0.160	0.082	0.372	0.049	0.115	0.056	0.096
10: Historical	-0.433	0.832	0.813	0.846	0.819	0.861	0.792	0.547	0.412	0.859	0.302	0.364	0.271
Synthetic	-0.161	0.264	0.229	0.244	0.257	0.242	0.173	0.029	0.109	0.369	0.197	0.189	0.203
11: Historical	-0.141	0.301	0.285	0.304	0.243	0.300	0.236	0.142	0.063	0.306	0.093	0.141	0.020
Synthetic	-0.102	0.162	0.129	0.145	0.041	0.125	0.034	-0.007	0.054	0.047	0.082	0.101	0.015
12: Historical	-0.181	0.375	0.375	0.385	0.327	0.388	0.350	0.282	0.119	0.406	0.052	0.058	-0.032
Synthetic	-0.099	0.150	0.091	0.105	0.030	0.117	0.029	0.037	0.097	0.067	0.023	0.003	-0.052
13: Historical	-0.104	0.341	0.335	0.354	0.288	0.358	0.246	0.234	0.073	0.343	0.142	0.223	0.071
Synthetic	-0.100	0.135	0.102	0.116	0.028	0.105	0.010	-0.009	0.039	0.072	0.141	0.156	0.074

JUNE LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.596	-0.434	-0.372	-0.371	-0.288	-0.343	-0.242	0.016	-0.103	-0.113	-0.352	-0.351	-0.324
Synthetic	0.603	-0.385	-0.342	-0.345	-0.332	-0.331	-0.293	0.073	-0.043	-0.205	-0.332	-0.338	-0.309
2: Historical	-0.280	0.679	0.677	0.665	0.533	0.655	0.510	0.353	0.262	0.498	0.521	0.528	0.553
Synthetic	-0.293	0.660	0.678	0.649	0.573	0.623	0.513	0.005	0.139	0.468	0.458	0.475	0.442
3: Historical	-0.178	0.636	0.677	0.644	0.524	0.634	0.548	0.307	0.203	0.484	0.508	0.514	0.554
Synthetic	-0.264	0.581	0.673	0.601	0.535	0.577	0.487	0.001	0.099	0.438	0.464	0.474	0.473
4: Historical	-0.237	0.670	0.697	0.683	0.552	0.675	0.548	0.362	0.265	0.521	0.526	0.546	0.581
Synthetic	-0.256	0.630	0.694	0.671	0.601	0.652	0.546	0.027	0.140	0.477	0.477	0.503	0.491
5: Historical	-0.237	0.704	0.731	0.726	0.632	0.722	0.609	0.418	0.326	0.587	0.548	0.577	0.602
Synthetic	-0.308	0.582	0.658	0.626	0.653	0.599	0.563	0.048	0.157	0.484	0.483	0.517	0.518
6: Historical	-0.237	0.673	0.700	0.692	0.562	0.687	0.549	0.392	0.298	0.550	0.519	0.546	0.583
Synthetic	-0.247	0.637	0.684	0.677	0.608	0.669	0.555	0.033	0.147	0.490	0.467	0.501	0.482
7: Historical	-0.159	0.581	0.634	0.606	0.524	0.597	0.562	0.251	0.206	0.483	0.495	0.509	0.529
Synthetic	-0.256	0.553	0.635	0.568	0.599	0.545	0.561	0.002	0.150	0.496	0.431	0.441	0.435
8: Historical	-0.211	0.560	0.558	0.574	0.456	0.588	0.388	0.654	0.464	0.569	0.383	0.406	0.470
Synthetic	-0.004	0.330	0.297	0.375	0.281	0.409	0.272	0.164	0.212	0.170	0.262	0.343	0.277
9: Historical	-0.142	0.538	0.513	0.550	0.520	0.587	0.385	0.730	0.844	0.727	0.290	0.417	0.332
Synthetic	-0.011	0.154	0.135	0.130	0.120	0.115	0.075	0.066	0.490	0.048	0.122	0.185	0.111
10: Historical	-0.087	0.719	0.798	0.775	0.719	0.791	0.726	0.611	0.490	0.852	0.493	0.512	0.600
Synthetic	-0.156	0.458	0.537	0.497	0.526	0.476	0.527	0.017	0.130	0.567	0.362	0.423	0.381
11: Historical	0.060	0.093	0.147	0.110	0.061	0.107	0.107	0.119	0.030	0.132	0.154	0.209	0.186
Synthetic	0.158	0.033	0.120	0.065	0.048	0.055	0.054	0.077	0.067	0.131	0.084	0.192	0.097
12: Historical	-0.028	0.021	0.065	0.036	0.009	0.023	0.032	0.039	-0.081	0.014	0.132	0.206	0.135
Synthetic	0.076	0.024	0.094	0.047	0.038	0.035	0.051	0.048	0.032	0.115	0.068	0.213	0.091
13: Historical	0.069	0.089	0.125	0.097	0.046	0.099	0.077	0.119	-0.003	0.116	0.122	0.170	0.134
Synthetic	0.161	0.040	0.099	0.049	0.015	0.049	0.039	0.048	0.044	0.096	0.069	0.166	0.074

JULY LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.562	-0.296	-0.267	-0.267	-0.226	-0.253	-0.201	-0.155	-0.072	-0.107	-0.085	-0.174	-0.121
Synthetic	0.619	-0.270	-0.267	-0.237	-0.285	-0.230	-0.208	-0.015	-0.011	-0.146	-0.029	-0.150	-0.092
2: Historical	-0.441	0.670	0.662	0.669	0.659	0.662	0.586	0.420	0.309	0.578	0.296	0.250	0.315
Synthetic	-0.353	0.681	0.633	0.639	0.604	0.621	0.537	0.242	0.137	0.414	0.292	0.287	0.314
3: Historical	-0.382	0.587	0.613	0.588	0.579	0.575	0.529	0.349	0.229	0.539	0.317	0.250	0.343
Synthetic	-0.317	0.632	0.635	0.610	0.606	0.577	0.547	0.183	0.094	0.408	0.300	0.301	0.320
4: Historical	-0.383	0.641	0.632	0.640	0.635	0.637	0.566	0.407	0.325	0.567	0.328	0.259	0.351
Synthetic	-0.337	0.681	0.645	0.663	0.649	0.642	0.576	0.246	0.144	0.438	0.304	0.315	0.329
5: Historical	-0.372	0.648	0.636	0.657	0.697	0.661	0.586	0.446	0.435	0.626	0.343	0.253	0.351
Synthetic	-0.352	0.621	0.593	0.628	0.679	0.611	0.563	0.236	0.182	0.452	0.347	0.337	0.369
6: Historical	-0.371	0.653	0.632	0.651	0.647	0.652	0.570	0.429	0.361	0.578	0.332	0.253	0.354
Synthetic	-0.335	0.692	0.637	0.671	0.653	0.658	0.584	0.269	0.156	0.450	0.314	0.317	0.340
7: Historical	-0.343	0.663	0.649	0.662	0.677	0.662	0.630	0.411	0.350	0.636	0.391	0.321	0.409
Synthetic	-0.345	0.684	0.669	0.680	0.700	0.658	0.678	0.216	0.144	0.496	0.342	0.348	0.362
8: Historical	-0.284	0.527	0.485	0.533	0.535	0.556	0.395	0.676	0.649	0.583	0.173	0.066	0.177
Synthetic	-0.025	0.333	0.282	0.330	0.300	0.331	0.224	0.361	0.100	0.258	0.232	0.188	0.203
9: Historical	-0.268	0.391	0.294	0.366	0.410	0.394	0.264	0.492	0.881	0.476	0.173	0.059	0.160
Synthetic	-0.129	0.157	0.090	0.115	0.116	0.098	0.058	0.133	0.507	0.100	0.165	0.093	0.178
10: Historical	-0.306	0.765	0.798	0.793	0.813	0.793	0.826	0.547	0.430	0.910	0.442	0.311	0.388
Synthetic	-0.291	0.675	0.679	0.706	0.712	0.703	0.723	0.291	0.203	0.720	0.382	0.403	0.338
11: Historical	-0.185	0.123	0.116	0.120	0.148	0.125	0.087	0.071	0.169	0.135	0.198	0.222	0.154
Synthetic	-0.044	0.161	0.179	0.167	0.177	0.131	0.153	0.045	0.106	0.114	0.256	0.252	0.221
12: Historical	-0.076	0.112	0.127	0.121	0.189	0.120	0.123	-0.015	0.189	0.123	0.200	0.244	0.161
Synthetic	-0.039	0.138	0.174	0.160	0.199	0.132	0.153	0.060	0.179	0.105	0.243	0.276	0.197
13: Historical	-0.133	0.137	0.132	0.151	0.193	0.161	0.121	0.085	0.178	0.154	0.230	0.264	0.188
Synthetic	-0.039	0.187	0.203	0.201	0.217	0.169	0.179	0.073	0.125	0.130	0.306	0.315	0.264

AUGUST LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.467	-0.287	-0.286	-0.267	-0.222	-0.251	-0.244	0.002	-0.058	-0.086	-0.231	-0.220	-0.254
Synthetic	0.519	-0.265	-0.259	-0.248	-0.232	-0.235	-0.241	0.055	-0.009	-0.170	-0.069	-0.093	-0.102
2: Historical	-0.379	0.678	0.633	0.702	0.675	0.719	0.709	0.288	0.228	0.513	0.410	0.476	0.445
Synthetic	-0.251	0.700	0.679	0.694	0.636	0.686	0.677	0.308	0.105	0.514	0.475	0.381	0.478
3: Historical	-0.349	0.576	0.549	0.595	0.578	0.607	0.616	0.249	0.185	0.470	0.349	0.410	0.370
Synthetic	-0.291	0.647	0.656	0.670	0.669	0.665	0.652	0.276	0.084	0.539	0.419	0.369	0.412
4: Historical	-0.383	0.659	0.621	0.690	0.676	0.708	0.701	0.284	0.205	0.516	0.385	0.456	0.430
Synthetic	-0.268	0.687	0.677	0.698	0.658	0.693	0.688	0.276	0.074	0.520	0.457	0.372	0.472
5: Historical	-0.352	0.648	0.603	0.668	0.709	0.683	0.673	0.254	0.227	0.521	0.315	0.381	0.370
Synthetic	-0.240	0.644	0.652	0.664	0.687	0.652	0.664	0.216	0.083	0.508	0.419	0.333	0.431
6: Historical	-0.386	0.670	0.637	0.713	0.706	0.734	0.724	0.301	0.212	0.528	0.393	0.462	0.443
Synthetic	-0.276	0.685	0.676	0.698	0.657	0.696	0.693	0.275	0.067	0.516	0.456	0.366	0.473
7: Historical	-0.320	0.619	0.590	0.660	0.668	0.679	0.701	0.249	0.209	0.484	0.413	0.501	0.470
Synthetic	-0.235	0.614	0.628	0.642	0.631	0.637	0.686	0.220	0.060	0.510	0.475	0.408	0.498
8: Historical	-0.319	0.555	0.480	0.526	0.506	0.536	0.511	0.569	0.303	0.515	0.289	0.238	0.273
Synthetic	-0.058	0.421	0.389	0.422	0.411	0.436	0.362	0.472	0.155	0.346	0.312	0.212	0.294
9: Historical	-0.222	0.333	0.262	0.333	0.408	0.355	0.338	0.546	0.891	0.358	0.222	0.191	0.223
Synthetic	-0.058	0.239	0.199	0.226	0.253	0.225	0.183	0.221	0.631	0.213	0.241	0.150	0.237
10: Historical	-0.225	0.647	0.623	0.684	0.737	0.703	0.781	0.426	0.383	0.853	0.303	0.366	0.339
Synthetic	-0.209	0.616	0.614	0.653	0.693	0.662	0.704	0.294	0.143	0.833	0.365	0.379	0.393
11: Historical	-0.132	0.291	0.218	0.270	0.244	0.280	0.238	-0.036	-0.031	0.154	0.128	0.179	0.146
Synthetic	-0.106	0.227	0.221	0.221	0.241	0.208	0.211	0.046	0.013	0.160	0.183	0.171	0.178
12: Historical	-0.181	0.258	0.202	0.263	0.272	0.277	0.243	-0.016	0.005	0.142	0.155	0.224	0.185
Synthetic	-0.169	0.184	0.182	0.203	0.261	0.202	0.201	0.034	0.021	0.128	0.173	0.222	0.188
13: Historical	-0.095	0.273	0.214	0.263	0.240	0.277	0.271	-0.035	-0.057	0.189	0.175	0.195	0.179
Synthetic	-0.061	0.242	0.237	0.247	0.267	0.247	0.260	0.071	-0.055	0.161	0.210	0.170	0.209

SEPTEMBER LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.280	-0.212	-0.265	-0.206	-0.201	-0.170	-0.244	0.129	-0.091	-0.203	-0.199	-0.164	-0.267
Synthetic	0.336	-0.137	-0.224	-0.121	-0.143	-0.092	-0.150	-0.013	-0.023	-0.198	-0.227	-0.217	-0.253
2: Historical	-0.309	0.726	0.605	0.701	0.702	0.715	0.671	0.482	0.327	0.671	0.515	0.601	0.547
Synthetic	-0.260	0.743	0.624	0.715	0.715	0.739	0.681	0.346	0.227	0.568	0.500	0.518	0.525
3: Historical	-0.229	0.611	0.543	0.598	0.603	0.596	0.577	0.445	0.311	0.636	0.471	0.554	0.493
Synthetic	-0.266	0.622	0.628	0.606	0.621	0.601	0.587	0.372	0.268	0.571	0.508	0.553	0.504
4: Historical	-0.313	0.706	0.615	0.700	0.697	0.710	0.665	0.472	0.298	0.672	0.542	0.625	0.566
Synthetic	-0.321	0.677	0.665	0.668	0.673	0.671	0.628	0.382	0.266	0.634	0.534	0.583	0.541
5: Historical	-0.269	0.601	0.523	0.603	0.700	0.612	0.599	0.349	0.258	0.633	0.498	0.584	0.471
Synthetic	-0.274	0.582	0.589	0.590	0.701	0.584	0.570	0.299	0.223	0.574	0.509	0.541	0.459
6: Historical	-0.310	0.714	0.624	0.718	0.707	0.732	0.674	0.492	0.275	0.671	0.550	0.633	0.571
Synthetic	-0.309	0.695	0.675	0.699	0.691	0.702	0.651	0.391	0.269	0.659	0.524	0.578	0.541
7: Historical	-0.242	0.634	0.560	0.631	0.653	0.632	0.647	0.385	0.300	0.627	0.553	0.601	0.549
Synthetic	-0.267	0.599	0.607	0.607	0.637	0.591	0.628	0.325	0.277	0.624	0.533	0.561	0.515
8: Historical	-0.192	0.579	0.512	0.590	0.572	0.612	0.531	0.687	0.303	0.552	0.292	0.316	0.303
Synthetic	-0.142	0.518	0.538	0.525	0.483	0.533	0.468	0.578	0.285	0.505	0.308	0.236	0.328
9: Historical	-0.028	0.162	0.140	0.144	0.143	0.147	0.144	0.341	0.802	0.283	-0.042	-0.010	-0.064
Synthetic	0.009	0.195	0.222	0.196	0.195	0.175	0.166	0.352	0.631	0.273	0.156	0.132	0.086
10: Historical	-0.246	0.663	0.611	0.665	0.699	0.663	0.655	0.556	0.423	0.846	0.422	0.405	0.420
Synthetic	-0.264	0.614	0.654	0.623	0.629	0.619	0.611	0.424	0.278	0.812	0.439	0.405	0.407
11: Historical	-0.194	0.347	0.285	0.345	0.385	0.352	0.347	0.143	0.176	0.244	0.233	0.246	0.216
Synthetic	-0.172	0.335	0.318	0.320	0.379	0.327	0.316	0.158	0.156	0.299	0.233	0.212	0.199
12: Historical	-0.120	0.258	0.180	0.238	0.315	0.244	0.251	0.140	0.171	0.209	0.148	0.174	0.093
Synthetic	-0.119	0.275	0.207	0.250	0.312	0.257	0.236	0.158	0.113	0.202	0.163	0.176	0.099
13: Historical	-0.170	0.288	0.231	0.289	0.359	0.296	0.300	0.110	0.151	0.229	0.221	0.225	0.187
Synthetic	-0.169	0.277	0.237	0.265	0.344	0.272	0.264	0.111	0.080	0.237	0.230	0.215	0.176

OCTOBER LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.526	-0.400	-0.420	-0.427	-0.439	-0.394	-0.413	-0.229	-0.040	-0.356	-0.309	-0.295	-0.275
Synthetic	0.449	-0.329	-0.333	-0.349	-0.346	-0.343	-0.339	-0.165	0.037	-0.218	-0.213	-0.249	-0.189
2: Historical	-0.150	0.751	0.705	0.743	0.709	0.737	0.673	0.624	0.132	0.643	0.468	0.468	0.397
Synthetic	-0.139	0.709	0.632	0.659	0.629	0.655	0.583	0.398	0.134	0.461	0.403	0.410	0.349
3: Historical	-0.245	0.670	0.733	0.709	0.686	0.690	0.650	0.529	0.156	0.682	0.378	0.406	0.310
Synthetic	-0.244	0.603	0.661	0.660	0.628	0.653	0.615	0.416	0.188	0.504	0.401	0.399	0.333
4: Historical	-0.199	0.733	0.733	0.757	0.733	0.751	0.702	0.604	0.151	0.687	0.466	0.456	0.390
Synthetic	-0.243	0.626	0.662	0.698	0.669	0.700	0.650	0.445	0.160	0.536	0.428	0.416	0.364
5: Historical	-0.243	0.692	0.700	0.717	0.775	0.706	0.666	0.523	0.149	0.660	0.471	0.460	0.409
Synthetic	-0.237	0.587	0.607	0.644	0.720	0.648	0.606	0.417	0.139	0.492	0.450	0.455	0.412
6: Historical	-0.161	0.734	0.728	0.758	0.741	0.754	0.710	0.614	0.151	0.687	0.483	0.469	0.406
Synthetic	-0.234	0.630	0.666	0.709	0.687	0.716	0.669	0.454	0.165	0.561	0.443	0.427	0.382
7: Historical	-0.134	0.682	0.674	0.700	0.740	0.692	0.715	0.504	0.166	0.610	0.514	0.515	0.443
Synthetic	-0.117	0.621	0.584	0.604	0.641	0.616	0.614	0.342	0.182	0.491	0.422	0.469	0.391
8: Historical	0.086	0.575	0.522	0.556	0.502	0.571	0.489	0.735	0.326	0.571	0.467	0.441	0.413
Synthetic	0.031	0.389	0.361	0.374	0.334	0.400	0.305	0.472	0.191	0.345	0.330	0.290	0.287
9: Historical	0.002	0.228	0.240	0.233	0.201	0.230	0.196	0.277	0.761	0.289	0.116	0.150	0.105
Synthetic	-0.061	0.340	0.380	0.379	0.419	0.366	0.331	0.346	0.500	0.320	0.283	0.248	0.242
10: Historical	-0.159	0.695	0.699	0.707	0.736	0.697	0.691	0.642	0.274	0.778	0.560	0.515	0.536
Synthetic	-0.197	0.541	0.592	0.618	0.606	0.612	0.600	0.477	0.193	0.731	0.475	0.434	0.445
11: Historical	-0.118	0.423	0.466	0.422	0.403	0.410	0.464	0.331	0.162	0.421	0.243	0.210	0.198
Synthetic	-0.125	0.308	0.372	0.321	0.312	0.302	0.358	0.202	0.159	0.250	0.231	0.226	0.202
12: Historical	-0.009	0.368	0.370	0.347	0.404	0.343	0.391	0.193	0.151	0.336	0.221	0.258	0.158
Synthetic	-0.094	0.265	0.302	0.276	0.335	0.260	0.304	0.130	0.164	0.192	0.233	0.306	0.212
13: Historical	-0.035	0.467	0.471	0.454	0.463	0.446	0.498	0.344	0.193	0.417	0.316	0.312	0.264
Synthetic	-0.117	0.357	0.408	0.367	0.395	0.354	0.406	0.225	0.205	0.278	0.297	0.333	0.261

NOVEMBER LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.674	-0.258	-0.385	-0.338	-0.382	-0.277	-0.332	-0.035	-0.111	-0.235	-0.257	-0.260	-0.219
Synthetic	0.622	-0.288	-0.401	-0.367	-0.382	-0.347	-0.374	-0.084	-0.050	-0.201	-0.225	-0.247	-0.240
2: Historical	-0.524	0.659	0.621	0.669	0.622	0.658	0.608	0.509	0.123	0.514	0.559	0.514	0.593
Synthetic	-0.504	0.659	0.686	0.715	0.656	0.710	0.591	0.351	0.277	0.478	0.539	0.563	0.581
3: Historical	-0.513	0.618	0.655	0.654	0.594	0.633	0.589	0.519	0.147	0.524	0.531	0.468	0.528
Synthetic	-0.541	0.653	0.724	0.712	0.651	0.703	0.630	0.398	0.311	0.506	0.525	0.522	0.544
4: Historical	-0.601	0.708	0.699	0.742	0.700	0.726	0.682	0.591	0.156	0.599	0.574	0.516	0.596
Synthetic	-0.575	0.700	0.739	0.766	0.717	0.758	0.652	0.416	0.296	0.524	0.557	0.552	0.588
5: Historical	-0.665	0.698	0.715	0.747	0.768	0.725	0.718	0.543	0.156	0.631	0.517	0.528	0.537
Synthetic	-0.627	0.704	0.747	0.765	0.778	0.753	0.698	0.386	0.295	0.513	0.512	0.551	0.548
6: Historical	-0.565	0.715	0.688	0.745	0.704	0.737	0.691	0.613	0.153	0.603	0.589	0.521	0.621
Synthetic	-0.546	0.709	0.734	0.771	0.720	0.769	0.657	0.437	0.304	0.528	0.571	0.555	0.607
7: Historical	-0.452	0.685	0.688	0.718	0.687	0.721	0.744	0.584	0.155	0.604	0.631	0.625	0.687
Synthetic	-0.490	0.655	0.732	0.730	0.707	0.732	0.716	0.415	0.356	0.554	0.592	0.625	0.657
8: Historical	-0.215	0.621	0.557	0.617	0.552	0.633	0.564	0.769	0.308	0.542	0.473	0.450	0.574
Synthetic	-0.140	0.418	0.386	0.402	0.364	0.425	0.424	0.737	0.265	0.299	0.329	0.278	0.378
9: Historical	-0.087	0.116	0.184	0.164	0.157	0.174	0.187	0.275	0.556	0.276	0.164	0.107	0.203
Synthetic	-0.120	0.306	0.384	0.370	0.361	0.385	0.342	0.356	0.544	0.421	0.307	0.264	0.345
10: Historical	-0.272	0.527	0.541	0.571	0.571	0.580	0.593	0.518	0.228	0.620	0.541	0.488	0.576
Synthetic	-0.236	0.420	0.498	0.519	0.503	0.533	0.495	0.385	0.367	0.652	0.386	0.384	0.401
11: Historical	-0.184	0.180	0.246	0.226	0.219	0.212	0.230	0.120	0.102	0.253	0.111	0.081	0.121
Synthetic	-0.201	0.224	0.303	0.317	0.292	0.332	0.286	0.176	0.234	0.259	0.118	0.158	0.178
12: Historical	-0.144	0.227	0.249	0.246	0.221	0.232	0.216	0.194	0.176	0.257	0.074	0.065	0.079
Synthetic	-0.181	0.272	0.237	0.251	0.235	0.262	0.287	0.209	0.170	0.198	0.024	0.069	0.062
13: Historical	-0.148	0.165	0.229	0.209	0.182	0.204	0.203	0.126	0.047	0.199	0.081	0.047	0.122
Synthetic	-0.157	0.200	0.282	0.277	0.239	0.299	0.266	0.149	0.237	0.219	0.118	0.145	0.198

DECEMBER LAG 1 CORRELATION COEFFICIENTS
(generation using lag 12 terms)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1: Historical	0.584	-0.150	-0.087	-0.125	-0.202	-0.099	-0.053	0.110	-0.133	-0.010	-0.330	-0.257	-0.294
Synthetic	0.539	-0.191	-0.165	-0.140	-0.240	-0.179	-0.192	0.017	-0.004	-0.074	-0.301	-0.227	-0.280
2: Historical	-0.434	0.750	0.655	0.697	0.665	0.693	0.688	0.607	0.127	0.623	0.526	0.418	0.524
Synthetic	-0.418	0.758	0.689	0.690	0.704	0.706	0.710	0.368	0.228	0.470	0.527	0.425	0.513
3: Historical	-0.416	0.718	0.705	0.690	0.671	0.671	0.687	0.589	0.220	0.624	0.560	0.411	0.558
Synthetic	-0.404	0.739	0.751	0.709	0.711	0.700	0.711	0.387	0.279	0.523	0.539	0.468	0.550
4: Historical	-0.485	0.776	0.721	0.772	0.764	0.764	0.760	0.676	0.178	0.693	0.555	0.441	0.562
Synthetic	-0.462	0.776	0.747	0.769	0.780	0.758	0.761	0.422	0.264	0.543	0.563	0.454	0.552
5: Historical	-0.430	0.734	0.695	0.726	0.740	0.710	0.717	0.548	0.105	0.587	0.502	0.376	0.516
Synthetic	-0.394	0.725	0.706	0.723	0.755	0.707	0.711	0.348	0.244	0.525	0.508	0.393	0.495
6: Historical	-0.464	0.781	0.719	0.784	0.771	0.783	0.778	0.706	0.177	0.716	0.544	0.446	0.558
Synthetic	-0.441	0.778	0.742	0.776	0.784	0.774	0.772	0.436	0.281	0.559	0.568	0.449	0.552
7: Historical	-0.318	0.661	0.622	0.619	0.604	0.614	0.704	0.539	0.154	0.546	0.452	0.306	0.518
Synthetic	-0.400	0.710	0.713	0.683	0.682	0.668	0.776	0.331	0.259	0.556	0.496	0.367	0.506
8: Historical	-0.196	0.566	0.526	0.577	0.509	0.584	0.578	0.773	0.123	0.620	0.390	0.412	0.361
Synthetic	-0.118	0.358	0.394	0.376	0.382	0.415	0.385	0.641	0.228	0.306	0.213	0.282	0.231
9: Historical	-0.085	0.241	0.289	0.253	0.183	0.258	0.239	0.430	0.574	0.228	0.191	0.231	0.182
Synthetic	-0.035	0.211	0.230	0.236	0.187	0.202	0.227	0.213	0.439	0.221	0.253	0.169	0.253
10: Historical	-0.236	0.572	0.555	0.535	0.488	0.532	0.605	0.551	0.086	0.689	0.471	0.335	0.496
Synthetic	-0.222	0.421	0.409	0.430	0.404	0.386	0.452	0.197	0.162	0.522	0.419	0.304	0.373
11: Historical	0.000	0.176	0.113	0.102	0.092	0.103	0.198	0.053	-0.078	0.142	0.162	0.135	0.202
Synthetic	-0.083	0.076	0.046	0.032	0.067	0.006	0.083	0.007	0.028	0.065	0.156	0.181	0.187
12: Historical	0.045	0.030	-0.007	-0.036	-0.012	-0.041	0.056	-0.091	-0.015	0.038	0.106	0.008	0.121
Synthetic	-0.037	-0.008	-0.041	-0.083	0.004	-0.072	0.001	-0.053	-0.007	0.015	0.086	0.079	0.084
13: Historical	-0.109	0.170	0.103	0.133	0.168	0.133	0.243	0.045	-0.092	0.109	0.084	0.028	0.084
Synthetic	-0.126	0.073	0.059	0.056	0.116	0.022	0.129	0.021	0.023	0.061	0.132	0.120	0.115

Appendix H

Statistics – Fully Developed Model

In this Appendix the abreviations used are defined below.

Abreviation	Full Title
Mean	Mean of the data.
St.Dev	Standard deviation of the data.
Cs.	Coefficient of skewness.
Ck.	Coefficient of kurtosis.
SC1	Lag 1 serial correlation coefficient.

SUMMARY STATISTICS FOR MDSNWY DATA (Gl)
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	55.4714	34.6226	0.6260	3.4408	0.6845
	variance	10.0322	9.4895	0.0645	0.5258	0.0039
February	mean	64.3274	24.3940	0.4771	3.1580	0.6662
	variance	11.7794	3.6068	0.0685	0.5869	0.0047
March	mean	61.3833	24.4774	0.8392	3.8331	0.6802
	variance	8.4072	4.4459	0.0662	0.5761	0.0050
April	mean	53.5067	29.0988	-0.1013	2.8479	0.5789
	variance	13.8528	4.8363	0.0490	0.0912	0.0047
May	mean	105.4774	34.3857	-0.1832	2.8386	0.4158
	variance	14.9512	4.9487	0.0310	0.1644	0.0077
June	mean	92.9940	35.4500	-0.6645	3.7568	0.6032
	variance	16.0145	13.3613	0.0681	0.4424	0.0079
July	mean	89.8071	36.2333	-0.4018	3.3383	0.6189
	variance	18.9599	13.0063	0.0915	0.7398	0.0060
August	mean	75.9500	37.2310	-0.7658	4.2355	0.5193
	variance	12.9428	11.0130	0.1430	2.1864	0.0062
September	mean	-23.6762	41.3512	-0.0752	2.8728	0.3356
	variance	17.3669	6.5601	0.0551	0.0965	0.0074
October	mean	-44.9083	50.0310	-0.3580	3.1196	0.4488
	variance	16.0878	10.9716	0.0555	0.2304	0.0059
November	mean	9.6726	39.7869	-0.2224	2.9767	0.6221
	variance	21.2998	11.8838	0.0638	0.2279	0.0046
December	mean	40.3333	28.9333	0.8057	4.0426	0.5392
	variance	9.1415	9.6948	0.1329	1.5598	0.0062
Annual	mean	580.4931	217.5895	-0.0688	3.0160	0.0589
	variance	593.8130	291.5557	0.0475	0.2698	0.0083

SUMMARY STATISTICS FOR MDMRGT DATA (GI)
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	17.2952	11.4179	1.5844	6.2381	0.6633
	variance	1.0258	1.6065	0.1073	2.5894	0.0049
February	mean	11.3548	6.5881	0.8679	3.3825	0.6322
	variance	0.5936	0.3553	0.0427	0.3147	0.0068
March	mean	12.2940	7.4988	1.5751	6.5996	0.5567
	variance	0.4707	0.8943	0.2144	4.9787	0.0089
April	mean	14.9000	11.8536	2.6930	14.9273	0.7363
	variance	1.3229	7.9408	1.9342	142.4016	0.0072
May	mean	22.8226	15.4929	1.8503	7.5148	0.5629
	variance	2.5936	5.0397	0.2488	8.7270	0.0120
June	mean	34.2857	26.6310	2.3195	9.7019	0.6598
	variance	7.4391	18.7655	0.1608	8.0792	0.0075
July	mean	47.8762	31.2488	1.1460	3.9408	0.6808
	variance	11.3570	9.0131	0.0511	0.5497	0.0051
August	mean	59.8381	34.7333	0.7631	3.5154	0.7002
	variance	10.1094	9.7148	0.0647	0.5107	0.0049
September	mean	70.8440	32.3060	0.5617	3.0513	0.7433
	variance	16.8449	7.6285	0.0431	0.2536	0.0030
October	mean	73.7107	37.2810	0.8085	3.9619	0.7088
	variance	19.4275	13.9199	0.1118	1.2556	0.0041
November	mean	45.4524	23.3000	0.6134	3.1222	0.6589
	variance	8.3314	3.3933	0.0432	0.2765	0.0067
December	mean	27.1250	15.6107	1.3129	5.5872	0.7577
	variance	2.1819	2.2578	0.1725	3.7641	0.0033
Annual	mean	437.8001	169.9247	0.7376	3.6123	0.1532
	variance	397.9440	246.7385	0.0933	0.9328	0.0102

SUMMARY STATISTICS FOR MDDART DATA (Gl)
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	29.8179	20.5643	1.2967	4.4433	0.6982
	variance	4.8752	3.0534	0.0752	0.8905	0.0038
February	mean	20.8476	14.7690	1.3995	4.7887	0.6163
	variance	2.9473	3.4438	0.0557	0.8772	0.0080
March	mean	22.0190	17.0524	2.1129	8.9329	0.6840
	variance	3.4095	8.9285	0.3819	15.3396	0.0067
April	mean	28.9679	30.1369	3.2791	17.8650	0.7156
	variance	10.6290	67.6503	1.6850	138.1221	0.0086
May	mean	46.3940	40.7131	2.2587	9.1954	0.5126
	variance	19.1109	51.4274	0.3207	12.2033	0.0153
June	mean	78.8798	72.1964	2.2742	8.9297	0.6728
	variance	49.6284	117.0329	0.1345	5.8885	0.0098
July	mean	111.0262	83.6369	1.4437	5.0034	0.6354
	variance	78.0769	81.9149	0.0633	1.0400	0.0081
August	mean	137.8369	85.1869	1.1074	4.1196	0.6564
	variance	62.9804	61.1575	0.0657	0.8057	0.0056
September	mean	158.2655	77.8119	0.8778	3.9891	0.6278
	variance	117.9987	64.3030	0.0979	1.3442	0.0049
October	mean	156.8095	85.3679	1.2820	5.5882	0.6614
	variance	94.7139	98.8904	0.2497	6.2791	0.0058
November	mean	91.5310	55.4714	0.9847	3.6374	0.7243
	variance	41.6325	23.1956	0.0366	0.3657	0.0051
December	mean	49.8798	31.2274	1.3515	5.0837	0.7510
	variance	11.3320	7.8796	0.0945	1.5085	0.0040
Annual	mean	932.2702	411.2833	0.9726	4.0728	0.1155
	variance	2410.5620	1407.6370	0.1034	1.4796	0.0098

SUMMARY STATISTICS FOR MDHUME DATA (Gl)
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	141.2702	96.5583	1.6359	6.4604	0.7465
	variance	100.0713	133.5198	0.2034	6.4030	0.0034
February	mean	90.4417	53.9250	0.9778	3.6108	0.6804
	variance	36.4569	25.3253	0.0328	0.3443	0.0067
March	mean	95.3976	60.8476	1.6323	6.4771	0.6160
	variance	33.8679	66.3259	0.2140	5.5814	0.0071
April	mean	125.3024	109.0738	3.0218	16.5493	0.7265
	variance	111.6072	673.4114	1.9257	160.2368	0.0092
May	mean	202.1726	263.1286	2.3465	10.0313	0.4975
	variance	278.7538	864.1250	0.3925	17.2078	0.0161
June	mean	336.3226	297.0964	2.3496	9.3688	0.6706
	variance	812.7743	2056.9830	0.1150	5.6845	0.0111
July	mean	484.6095	358.0048	1.3431	4.4773	0.6629
	variance	1304.9730	1199.4570	0.0602	0.9295	0.0057
August	mean	600.4631	386.1071	0.8428	3.6030	0.6973
	variance	1085.0840	1070.4440	0.0662	0.6065	0.0052
September	mean	702.1857	353.3452	0.8138	3.4631	0.6684
	variance	2304.3170	1050.6400	0.0641	0.5836	0.0043
October	mean	719.8512	403.9095	1.3438	5.6228	0.6984
	variance	2266.4670	2065.2640	0.1926	4.3752	0.0054
November	mean	423.0679	239.3357	0.6166	2.8125	0.7660
	variance	817.5882	294.3777	0.0281	0.1418	0.0043
December	mean	232.0440	138.3357	1.2054	4.6915	0.7694
	variance	209.1709	134.0604	0.0872	1.4459	0.0032
Annual	mean	4143.1130	1839.8290	0.9001	3.8399	0.1068
	variance	45588.4800	26454.2900	0.0951	1.1623	0.0102

SUMMARY STATISTICS FOR MDKIEW DATA (Gl)
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	18.9071	13.5298	1.3322	5.3124	0.6574
	variance	2.1845	2.4481	0.1582	3.0674	0.0043
February	mean	12.7702	9.8060	1.6201	6.4431	0.6260
	variance	1.6599	2.3092	0.1980	5.0918	0.0062
March	mean	14.5738	12.3405	1.3115	4.9653	0.4198
	variance	1.6605	2.0477	0.1181	1.7802	0.0099
April	mean	20.2333	21.0571	3.4532	20.2452	0.5800
	variance	5.0153	43.6769	2.1656	172.1372	0.0127
May	mean	34.1786	30.0583	2.8086	13.8303	0.3974
	variance	8.9518	38.1593	0.6872	36.2913	0.0233
June	mean	52.8976	40.7833	1.9884	7.5996	0.6535
	variance	17.4771	35.1441	0.1242	5.0758	0.0085
July	mean	70.2810	47.4179	1.5447	5.7764	0.6792
	variance	24.4702	27.8991	0.1490	3.0874	0.0061
August	mean	81.8738	49.1429	0.7605	3.3133	0.6866
	variance	20.0586	13.6569	0.0438	0.2952	0.0051
September	mean	101.5167	49.2560	0.8402	3.5198	0.7012
	variance	42.6645	21.9225	0.0667	0.6730	0.0038
October	mean	104.3107	54.8429	1.2437	5.2107	0.7199
	variance	37.3634	34.8446	0.1484	2.7654	0.0045
November	mean	63.2357	34.1031	0.5426	2.6827	0.7784
	variance	14.7939	4.4185	0.0232	0.1123	0.0033
December	mean	31.5762	19.2095	0.8153	3.3389	0.7550
	variance	4.6406	2.0071	0.0402	0.3806	0.0039
Annual	mean	606.3580	254.6276	0.8828	3.9484	0.1587
	variance	884.5665	541.2693	0.1184	1.7594	0.0094

SUMMARY STATISTICS FOR HUNREG DATA (Gl)
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	88.3012	66.3452	1.8659	7.6424	0.7466
	variance	44.6406	83.2652	0.3299	13.1095	0.0036
February	mean	55.5750	34.7833	1.0392	3.8731	0.7292
	variance	15.2378	11.9332	0.0535	0.5397	0.0050
March	mean	56.9464	37.8619	1.7317	7.0107	0.5972
	variance	13.0216	31.3048	0.2443	6.9903	0.0064
April	mean	73.1071	65.3167	3.1980	18.2758	0.7294
	variance	39.9159	304.7568	2.3855	207.9530	0.0085
May	mean	119.6345	103.0833	2.6800	12.3997	0.4795
	variance	129.8751	444.3103	0.5309	27.9742	0.0178
June	mean	210.1321	200.0476	2.4606	9.9272	0.6691
	variance	363.1393	1039.0880	0.1214	6.5865	0.0122
July	mean	320.6869	260.6560	1.5493	5.2192	0.6578
	variance	683.0465	745.8813	0.0770	1.3566	0.0065
August	mean	398.6262	283.0357	0.8757	3.8536	0.6943
	variance	578.5848	626.8071	0.0908	1.0068	0.0051
September	mean	432.8583	246.8500	0.9439	3.7039	0.7029
	variance	1088.2340	577.8153	0.0739	0.7088	0.0037
October	mean	433.9631	274.5940	1.5372	6.2327	0.7158
	variance	1138.0480	1242.0780	0.2184	4.8663	0.0048
November	mean	260.5476	155.7571	0.6418	2.7796	0.7693
	variance	360.5748	124.7379	0.0274	0.1394	0.0042
December	mean	144.1893	93.7893	1.2885	4.9890	0.7737
	variance	91.7453	77.7077	0.1090	1.9694	0.0028
Annual	mean	2594.5640	1277.4030	1.0101	4.1191	0.0965
	variance	21827.2100	14824.7200	0.1099	1.4688	0.0111

SUMMARY STATISTICS FOR OVENMD DATA (GI)
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	27.1690	24.8083	1.8097	6.7386	0.7837
	variance	6.7788	8.2991	0.1194	3.7562	0.0035
February	mean	17.1988	22.4476	3.0213	14.4577	0.6142
	variance	5.6514	25.9849	0.6570	45.5298	0.0093
March	mean	19.2333	21.0143	2.3260	9.3956	0.6408
	variance	5.3560	12.1853	0.2332	9.1605	0.0133
April	mean	33.4405	56.3071	4.6024	29.5649	0.7046
	variance	34.7853	419.8332	2.5654	291.9192	0.0119
May	mean	67.7667	112.6750	3.6960	18.4571	0.3581
	variance	180.9468	963.5706	0.6948	62.2030	0.0337
June	mean	147.2619	171.1940	2.3489	9.1192	0.5609
	variance	286.6152	650.2244	0.1291	6.1841	0.0145
July	mean	252.4405	217.8821	1.5107	5.2378	0.6776
	variance	548.4822	513.5991	0.0904	1.4989	0.0061
August	mean	317.7107	228.3595	0.8891	3.8612	0.6852
	variance	372.9807	349.4521	0.0749	0.6784	0.0044
September	mean	286.9702	174.3131	0.7367	3.1364	0.6286
	variance	476.4055	187.7879	0.0386	0.2754	0.0044
October	mean	228.0024	168.1857	0.9518	3.9415	0.6158
	variance	338.1764	211.1634	0.0624	0.7158	0.0069
November	mean	122.6512	96.8976	1.2412	4.2611	0.7153
	variance	119.8939	86.3537	0.0626	0.8497	0.0054
December	mean	62.4595	62.5512	2.2613	8.9347	0.7757
	variance	48.0046	83.9693	0.1998	9.3012	0.0043
Annual	mean	1582.3140	917.1927	1.0475	4.2310	0.0240
	variance	9951.9760	7352.1480	0.1130	1.4941	0.0122

SUMMARY STATISTICS FOR MURRUM DATA (Gl)
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	39.5524	50.1179	2.9182	17.6753	0.4803
	variance	35.9719	322.0649	3.3123	276.0087	0.0151
February	mean	29.0488	25.2905	0.7129	3.6518	0.7400
	variance	7.3223	5.8110	0.1028	1.2158	0.0092
March	mean	38.6179	79.6905	4.7715	35.6504	0.5688
	variance	123.6598	3718.0900	8.1353	858.4508	0.0202
April	mean	51.7595	186.2464	5.9283	39.7548	0.2917
	variance	416.6489	4581.5250	3.3284	534.6736	0.0446
May	mean	122.9000	408.4857	3.7458	15.7494	0.1266
	variance	2267.7520	6723.8700	1.1164	75.5571	0.0290
June	mean	336.7643	810.1548	2.3296	6.6861	0.1636
	variance	8572.2390	12035.1000	0.3758	12.0786	0.0255
July	mean	384.4905	892.6345	2.6041	8.2861	0.3614
	variance	10823.4000	16819.6000	0.3018	9.7740	0.0220
August	mean	252.3488	482.7988	2.0927	5.8592	0.4723
	variance	2994.8460	3249.7810	0.1861	3.9399	0.0116
September	mean	254.2333	474.5310	2.4463	7.9848	0.5781
	variance	2927.1430	4303.3510	0.2240	8.4404	0.0106
October	mean	224.8238	410.2214	2.8688	11.6337	0.4742
	variance	2385.9550	5445.7950	0.3078	21.6794	0.0150
November	mean	91.6060	151.8024	2.3119	8.0028	0.7408
	variance	343.9102	484.3670	0.1694	7.3791	0.0060
December	mean	44.3714	67.4060	3.0388	13.8758	0.6476
	variance	60.9575	181.3333	0.2531	17.4877	0.0107
Annual	mean	1870.5080	2385.6220	1.8058	5.9558	0.1493
	variance	84563.5100	89757.8100	0.1309	4.0757	0.0139

SUMMARY STATISTICS FOR INFMEN DATA (GI)

data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	199.5536	447.3798	3.6958	17.7011	0.5670
	variance	1939.2740	8308.4890	0.4518	43.9381	0.0136
February	mean	181.7464	355.6738	3.3828	15.7848	0.5986
	variance	1519.6770	5743.0580	0.5445	45.2044	0.0143
March	mean	266.8798	488.1190	3.0313	12.7175	0.4808
	variance	2946.9870	7418.4170	0.3440	23.2820	0.0234
April	mean	282.1524	561.2131	2.9696	16.1446	0.3909
	variance	3114.6780	18645.8500	1.2614	74.6632	0.0197
May	mean	303.1464	751.8036	3.7850	17.7390	0.3722
	variance	5464.4020	20438.0700	0.5267	54.4479	0.0196
June	mean	208.9798	597.3298	4.4114	23.5504	0.4896
	variance	4238.6460	20606.7900	1.1081	144.3789	0.0297
July	mean	259.6750	635.7750	3.6709	16.8237	0.5072
	variance	5678.6060	23558.6900	0.5040	43.7768	0.0339
August	mean	335.9333	716.4738	3.4245	15.3166	0.6310
	variance	5900.7400	24581.0100	0.4831	45.5653	0.0208
September	mean	354.1893	770.0381	3.4012	15.0688	0.0183
	variance	2927.1430	4303.3510	0.2240	8.4404	0.0106
October	mean	245.7440	533.8548	3.0696	11.9013	0.4997
	variance	3863.6780	8442.7400	0.3989	21.3632	0.0179
November	mean	208.8571	483.2238	3.1482	12.5797	0.5436
	variance	3465.5970	7981.5670	0.6907	53.6624	0.0204
December	mean	210.5262	478.8036	3.0249	11.4744	0.4390
	variance	2649.4820	5367.9450	0.4895	38.3472	0.0216
Annual	mean	3057.3850	3693.3670	2.1166	8.0491	0.1782
	variance	99999.9999	99999.9999	0.2627	11.2740	0.0180

SUMMARY STATISTICS FOR MDBCGR DATA (Gl)
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	24.3917	17.3750	2.9185	12.6719	0.5380
	variance	2.7140	7.3364	0.2879	16.4450	0.0158
February	mean	18.3167	11.9036	3.1542	16.0935	0.3381
	variance	1.8103	10.6893	0.9869	57.0781	0.0235
March	mean	21.0631	15.2167	3.5772	17.6723	0.5136
	variance	2.2546	10.0889	0.5079	46.1840	0.0210
April	mean	26.4714	39.6512	5.4087	35.4792	0.2911
	variance	17.6025	191.6399	2.7062	395.8565	0.0394
May	mean	44.7000	89.4964	5.3038	35.1667	0.3691
	variance	122.1853	1682.5570	2.3028	301.5587	0.0491
June	mean	144.9274	261.4845	4.0944	20.5754	0.5668
	variance	1011.0890	4400.8080	1.1290	130.4151	0.0334
July	mean	207.8524	342.7714	2.6780	9.8551	0.7199
	variance	1587.4550	3312.4640	0.2400	10.5919	0.0105
August	mean	275.7488	361.6500	2.1682	8.4692	0.8328
	variance	1921.9220	2572.3440	0.1423	5.3345	0.0054
September	mean	274.0155	377.5476	2.4515	9.2547	0.8119
	variance	2440.8590	4339.5360	0.2162	9.7635	0.0036
October	mean	192.6940	314.6702	2.8399	10.8312	0.7306
	variance	1358.9740	2630.9140	0.2534	12.2314	0.0078
November	mean	99.3631	180.7821	3.2422	13.2954	0.6523
	variance	466.4412	1224.5690	0.5257	40.3552	0.0147
December	mean	53.5643	95.4036	4.2245	22.4651	0.5217
	variance	100.9869	601.2456	0.7784	98.8803	0.0285
Annual	mean	1353.0970	1583.9450	2.2995	8.5718	0.0519
	variance	41246.4300	66534.2600	0.2360	11.5636	0.0091

SUMMARY STATISTICS FOR MDRNDN DATA (mm)
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	31.5012	43.2619	2.1150	8.7544	0.0926
	variance	14.8922	37.7113	0.2140	7.8210	0.0130
February	mean	25.8226	28.5512	1.6919	5.4737	0.0512
	variance	9.2003	10.0635	0.0522	1.1306	0.0122
March	mean	30.9929	33.9393	1.7687	6.0867	0.1286
	variance	9.3754	15.3841	0.0706	1.5897	0.0137
April	mean	28.3690	25.4512	1.1488	3.8043	0.0974
	variance	6.4359	4.2902	0.0405	0.4500	0.0136
May	mean	39.0560	30.2595	0.9938	3.4116	0.0822
	variance	9.0227	5.9128	0.0269	0.2497	0.0098
June	mean	42.3190	26.5286	0.7035	3.1103	0.0843
	variance	4.4066	4.6076	0.0412	0.2688	0.0146
July	mean	36.3143	24.0131	0.9995	3.7449	0.2563
	variance	5.5480	4.7296	0.0354	0.3789	0.0102
August	mean	37.4357	22.5262	0.8658	3.6192	0.1833
	variance	4.7247	3.6371	0.0766	0.7115	0.0111
September	mean	35.3298	22.8929	1.0265	3.6723	0.2329
	variance	7.1840	4.8997	0.0320	0.4621	0.0164
October	mean	40.6833	28.7750	0.9551	3.3996	0.2315
	variance	11.5137	5.5559	0.0462	0.3804	0.0114
November	mean	27.1583	25.6976	1.6939	6.0932	0.1182
	variance	6.9135	7.7935	0.1011	2.4536	0.0114
December	mean	30.5631	32.6500	1.8707	6.7203	0.1561
	variance	9.1399	18.0866	0.1001	2.8583	0.0133
Annual	mean	405.5288	125.0315	0.5068	3.1937	0.0895
	variance	152.9032	105.2538	0.0856	0.8327	0.0122

SUMMARY STATISTICS FOR MDRNKR DATA (mm)
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	23.9393	29.3512	1.8150	6.7765	0.2661
	variance	7.2137	14.0775	0.1089	3.0505	0.0144
February	mean	25.1357	32.1452	2.2342	8.4647	0.0570
	variance	10.4057	21.5926	0.1719	7.8453	0.0136
March	mean	29.7226	32.2988	1.5963	5.1075	0.1434
	variance	6.6194	10.5380	0.0393	0.6982	0.0127
April	mean	24.4345	22.2845	1.3304	4.5088	0.0729
	variance	4.8208	3.1105	0.0614	0.9172	0.0137
May	mean	36.7631	27.5702	0.9907	3.7984	0.0030
	variance	10.7619	5.3845	0.0638	0.8107	0.0108
June	mean	37.4417	23.2774	0.8553	3.8848	0.2141
	variance	4.5613	4.6488	0.0833	0.6511	0.0116
July	mean	35.3929	21.1512	0.9534	3.8192	0.2770
	variance	5.0472	3.7425	0.0428	0.5344	0.0104
August	mean	37.3595	20.5321	0.6559	3.2403	0.2224
	variance	4.6114	2.6668	0.0601	0.5214	0.0115
September	mean	35.0119	21.9083	0.7456	3.1325	0.1760
	variance	5.8372	3.8625	0.0340	0.2233	0.0165
October	mean	39.7607	30.3060	1.0991	3.8819	0.3061
	variance	12.5528	0.0008	68080.0000	4850.0000	47980.0000
November	mean	25.8464	19.8702	1.1550	4.4960	0.0704
	variance	2.9693	2.7216	0.0923	1.3302	0.0103
December	mean	25.3905	28.8702	2.0909	7.8658	0.0789
	variance	5.4801	12.8399	0.1382	4.9666	0.0108
Annual	mean	376.2130	110.2109	0.4562	3.1436	0.1332
	variance	120.8045	85.7878	0.0795	0.5947	0.0133

SUMMARY STATISTICS FOR MDRNTC DATA (mm)
data generated using the fully developed model

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	34.3321	43.1226	2.2591	8.7106	0.0664
	variance	16.7591	31.0466	0.2166	8.5888	0.0153
February	mean	26.9238	35.7750	2.3162	8.6374	0.0689
	variance	14.5110	29.1809	0.1311	5.2373	0.0128
March	mean	36.4583	39.4202	1.8452	6.5146	0.1699
	variance	11.4921	24.1636	0.1087	2.5344	0.0124
April	mean	32.9893	29.8024	1.3143	4.3709	0.1934
	variance	9.9542	7.1725	0.0457	0.5786	0.0117
May	mean	42.0810	34.5214	1.2263	4.2244	0.0738
	variance	12.3360	12.6858	0.0520	0.6464	0.0095
June	mean	46.9202	28.7702	0.4782	2.7353	0.0748
	variance	6.1009	3.9561	0.0294	0.1072	0.0142
July	mean	41.4798	23.5012	0.5873	2.7912	0.2642
	variance	5.1881	2.5153	0.0254	0.1021	0.0101
August	mean	43.8607	23.9738	0.5252	2.9024	0.2092
	variance	4.2241	3.4215	0.0370	0.1934	0.0114
September	mean	38.0429	21.9786	0.7324	3.0740	0.1760
	variance	7.1297	2.8617	0.0283	0.2087	0.0158
October	mean	47.0321	34.5881	1.0583	3.8996	0.2607
	variance	20.1562	13.2206	0.0708	0.7368	0.0123
November	mean	31.0988	28.4536	1.4825	5.2568	0.1984
	variance	9.5734	9.5912	0.0671	1.4259	0.0104
December	mean	32.2917	33.6512	1.6199	5.4987	0.1154
	variance	7.6576	16.2963	0.0714	1.5569	0.0107
Annual	mean	453.4993	137.8658	0.4678	3.1579	0.1492
	variance	182.0347	140.8404	0.0967	0.6493	0.0134

Appendix I

Statistics – Lag 1 with Box-Cox Transform

In this Appendix the abreviations used are defined below.

Abreviation	Full Title
Mean	Mean of the data.
St.Dev	Standard deviation of the data.
Cs.	Coefficient of skewness.
Ck.	Coefficient of kurtosis.
SC1	Lag 1 serial correlation coefficient.

SUMMARY STATISTICS FOR MDSNWY DATA (Gl)
data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	55.4714	34.6226	0.6260	3.4408	0.6845
	variance	10.0322	9.4895	0.0645	0.5258	0.0039
February	mean	64.3274	24.3940	0.4771	3.1580	0.6662
	variance	11.7794	3.6068	0.0685	0.5869	0.0047
March	mean	61.3833	24.4774	0.8392	3.8331	0.6802
	variance	8.4072	4.4459	0.0662	0.5761	0.0050
April	mean	53.5607	29.0988	-0.1013	2.8479	0.5789
	variance	13.8528	4.8363	0.0490	0.0912	0.0047
May	mean	105.4774	34.3857	-0.1832	2.8386	0.4158
	variance	14.9512	4.9487	0.0310	0.1644	0.0077
June	mean	92.9940	35.4500	-0.6645	3.7568	0.6032
	variance	16.0145	13.3613	0.0681	0.4424	0.0079
July	mean	89.8071	36.2333	-0.4018	3.3383	0.6189
	variance	18.9599	13.0063	0.0915	0.7398	0.0060
August	mean	75.9500	37.2310	-0.7658	4.2355	0.5193
	variance	12.9428	11.0130	0.1430	2.1864	0.0062
September	mean	-23.5762	41.3512	-0.0752	2.8728	0.3356
	variance	17.3669	6.5601	0.0551	0.0965	0.0074
October	mean	-44.9083	50.0310	-0.3580	3.1196	0.4488
	variance	16.0878	10.9716	0.0555	0.2304	0.0059
November	mean	9.6726	39.7869	-0.2224	2.9767	0.6221
	variance	21.2998	11.8838	0.0638	0.2279	0.0046
December	mean	40.3333	28.9333	0.8057	4.0426	0.5392
	variance	9.1415	9.6948	0.1329	1.5598	0.0062
Annual	mean	580.4931	217.5895	-0.0688	3.0160	0.0589
	variance	593.8130	291.5557	0.0475	0.2698	0.0083

SUMMARY STATISTICS FOR MDMRGT DATA (Gl)
data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	17.2964	11.4155	1.5857	6.2403	0.6633
	variance	1.0254	1.6076	0.1076	2.5983	0.0049
February	mean	11.3548	6.5881	0.8679	3.3825	0.6322
	variance	0.5936	0.3553	0.0427	0.3147	0.0068
March	mean	12.2940	7.4976	1.5761	6.6007	0.5567
	variance	0.4707	0.8947	0.2141	4.9817	0.0089
April	mean	14.9012	11.8488	2.6944	14.9309	0.7362
	variance	1.3184	7.9519	1.9323	142.3985	0.0072
May	mean	22.8226	15.4929	1.8503	7.5148	0.5629
	variance	2.5936	5.0397	0.2488	8.7270	0.0120
June	mean	34.2857	26.6310	2.3195	9.7019	0.6598
	variance	7.4391	18.7655	0.1608	8.0792	0.0075
July	mean	47.8762	31.2488	1.1460	3.9408	0.6808
	variance	11.3570	9.0131	0.0511	0.5497	0.0051
August	mean	59.8702	34.6762	0.7730	3.5140	0.7004
	variance	10.0513	9.7108	0.0635	0.5173	0.0049
September	mean	70.8440	32.3048	0.5618	3.0513	0.7429
	variance	16.8449	7.6231	0.0432	0.2536	0.0031
October	mean	73.7274	37.2440	0.8150	3.9594	0.7087
	variance	19.3377	13.8738	0.1106	1.2648	0.0041
November	mean	45.4595	23.2869	0.6158	3.1200	0.6589
	variance	8.3256	3.3725	0.0428	0.2774	0.0067
December	mean	27.1262	15.6036	1.3156	5.5906	0.7575
	variance	2.1865	2.2394	0.1738	3.7799	0.0033
Annual	mean	437.8604	169.8287	0.7407	3.6123	0.1533
	variance	397.2393	246.6488	0.0930	0.9358	0.0102

SUMMARY STATISTICS FOR MDDART DATA (Gl)
data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	29.8179	20.5643	1.2967	4.4433	0.6982
	variance	4.8752	3.0534	0.0752	0.8905	0.0038
February	mean	20.8476	14.7690	1.3995	4.7887	0.6163
	variance	2.9473	3.4438	0.0557	0.8772	0.0080
March	mean	22.0190	17.0524	2.1130	8.9330	0.6840
	variance	3.4095	8.9285	0.3818	15.3389	0.0067
April	mean	28.9679	30.1369	3.2791	17.8650	0.7156
	variance	10.6290	67.6503	1.6850	138.1221	0.0086
May	mean	46.3940	40.7131	2.2587	9.1954	0.5126
	variance	19.1109	51.4274	0.3207	12.2033	0.0153
June	mean	78.8798	72.1964	2.2742	8.9297	0.6728
	variance	49.6284	117.0329	0.1345	5.8885	0.0098
July	mean	111.0262	83.6369	1.4437	5.0034	0.6354
	variance	78.0769	81.9149	0.0633	1.0400	0.0081
August	mean	137.8369	85.1869	1.1074	4.1196	0.6564
	variance	62.9804	61.1575	0.0657	0.8057	0.0056
September	mean	158.2667	77.8071	0.8783	3.9889	0.6278
	variance	118.0232	64.3142	0.0979	1.3449	0.0049
October	mean	156.8155	85.3583	1.2829	5.5883	0.6613
	variance	94.6326	98.9051	0.2491	6.2788	0.0058
November	mean	91.5310	55.4714	0.9847	3.6374	0.7243
	variance	41.6325	23.1956	0.0366	0.3657	0.0051
December	mean	49.8798	31.2262	1.3517	5.0839	0.7510
	variance	11.3320	7.8771	0.0945	1.5087	0.0040
Annual	mean	932.2791	411.2699	0.9728	4.0729	0.1155
	variance	2410.2796	1407.5611	0.1034	1.4797	0.0098

SUMMARY STATISTICS FOR MDHUME DATA (Gl)
data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	141.2702	96.5583	1.6359	6.4604	0.7465
	variance	100.0713	133.5198	0.2034	6.4030	0.0034
February	mean	90.4417	53.9250	0.9778	3.6108	0.6804
	variance	36.4569	25.3253	0.0328	0.3443	0.0067
March	mean	95.3988	60.8464	1.6325	6.4773	0.6160
	variance	33.8493	66.3297	0.2138	5.5807	0.0071
April	mean	125.3024	109.0738	3.0218	16.5493	0.7265
	variance	111.6072	673.4114	1.9257	160.2368	0.0092
May	mean	202.1726	163.1286	2.3465	10.0313	0.4975
	variance	278.7538	864.1250	0.3925	17.2078	0.0161
June	mean	336.3226	297.0964	2.3496	9.3688	0.6706
	variance	812.7743	2056.9828	0.1150	5.6485	0.0111
July	mean	484.6095	358.0048	1.3431	4.4773	0.6629
	variance	1304.9727	1199.4571	0.0602	0.9295	0.0057
August	mean	601.1381	385.0024	0.8589	3.6063	0.6976
	variance	1077.7554	1070.7313	0.0648	0.6185	0.0052
September	mean	702.1857	353.3452	0.8138	3.4631	0.6681
	variance	2304.2169	1050.6399	0.0641	0.5836	0.0044
October	mean	719.8679	403.8774	1.3443	5.6236	0.6984
	variance	2265.3203	2064.8784	0.1927	4.3778	0.0054
November	mean	423.0679	239.3357	0.6166	2.8125	0.7660
	variance	817.5882	294.3777	0.0281	0.1418	0.0043
December	mean	232.0464	138.3310	1.2056	4.6916	0.7694
	variance	209.2435	134.0829	0.0871	1.4461	0.0032
Annual	mean	4153.8065	1838.8914	0.9026	3.8417	0.1070
	variance	45518.4076	26468.3373	0.0950	1.1667	0.0102

SUMMARY STATISTICS FOR MDKIEW DATA (Gl)
data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	18.9262	13.5083	1.3440	5.3282	0.6570
	variance	2.1788	2.4593	0.1589	3.1143	0.0044
February	mean	12.7726	9.8012	1.6261	6.4526	0.6255
	variance	1.6495	2.3160	0.1962	5.0938	0.0063
March	mean	14.6536	12.2321	1.3601	5.0358	0.4189
	variance	1.6379	2.0834	0.1137	1.8498	0.0100
April	mean	20.2369	21.0536	3.4551	20.2541	0.5801
	variance	5.0277	43.7110	2.1641	172.1863	0.0129
May	mean	34.1810	30.0536	2.8091	13.8329	0.3973
	variance	8.9601	38.1071	0.6875	36.3044	0.0233
June	mean	52.8976	40.7833	1.9884	7.5996	0.6534
	variance	17.4771	35.1441	0.1242	5.0758	0.0085
July	mean	70.2810	47.4179	1.5447	5.7764	0.6792
	variance	24.4702	27.8991	0.1490	3.0874	0.0061
August	mean	81.9298	49.0429	0.7721	3.3119	0.6869
	variance	19.8556	13.7275	0.0428	0.2999	0.0051
September	mean	101.5167	49.2560	0.8402	3.5198	0.7011
	variance	42.6645	21.9225	0.0667	0.6730	0.0038
October	mean	104.3107	54.8417	1.2440	5.2110	0.7199
	variance	37.3634	34.8540	0.1485	2.7660	0.0045
November	mean	63.2357	34.0131	0.5426	2.6827	0.7784
	variance	14.7939	4.4185	0.0232	0.1123	0.0033
December	mean	31.5786	19.2060	0.8161	3.3391	0.7550
	variance	4.6465	2.0039	0.0403	0.3809	0.0039
Annual	mean	606.5264	254.4906	0.8849	3.9506	0.1587
	variance	882.3686	541.5330	0.1186	1.7665	0.0095

SUMMARY STATISTICS FOR HUNREG DATA (Gl)

data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	88.3012	66.3452	1.8659	7.6424	0.7466
	variance	44.6406	83.2652	0.3299	13.1095	0.0036
February	mean	55.5750	34.7798	1.0394	3.8731	0.7292
	variance	15.2378	11.9334	0.0534	0.5398	0.0050
March	mean	56.9476	37.8583	1.7322	7.0111	0.5972
	variance	13.0078	31.3222	0.2437	6.9890	0.0065
April	mean	73.1071	65.3167	3.1980	18.2758	0.7294
	variance	39.9159	304.7568	2.3855	207.9530	0.0085
May	mean	119.6345	103.0833	2.6800	12.3997	0.4795
	variance	129.8751	444.3103	0.5309	27.9742	0.0178
June	mean	210.1321	200.0476	2.4606	9.9272	0.6691
	variance	363.1393	1039.0878	0.1214	6.5865	0.0122
July	mean	320.6869	260.6560	1.5493	5.2192	0.6578
	variance	683.0465	745.8813	0.0770	1.3566	0.0065
August	mean	400.5500	280.0226	0.9340	3.8843	0.6956
	variance	568.7288	625.9095	0.0870	1.0787	0.0052
September	mean	432.8583	246.8500	0.9439	3.7039	0.7023
	variance	1088.2335	577.8153	0.0739	0.7088	0.0038
October	mean	433.9726	274.5762	1.5377	6.2337	0.7158
	variance	1136.9986	1242.5621	0.2186	4.8690	0.0048
November	mean	260.5476	155.7571	0.6418	2.7796	0.7693
	variance	360.5748	124.7379	0.0274	0.1394	0.0042
December	mean	144.1929	93.7786	1.2891	4.9893	0.7737
	variance	91.8139	77.7400	0.1088	1.9706	0.0028
Annual	mean	2596.5051	1274.9236	1.0194	4.1286	0.0971
	variance	21769.6134	14821.7606	0.1094	1.4858	0.0111

SUMMARY STATISTICS FOR OVENMD DATA (GI)
data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	27.1690	24.8048	1.8075	6.7391	0.7837
	variance	6.7788	8.3082	0.1193	3.7557	0.0035
February	mean	17.2012	22.4476	3.0217	14.4600	0.6142
	variance	5.6582	25.9849	0.6571	45.5434	0.0093
March	mean	19.2357	21.0143	2.3263	9.3969	0.6407
	variance	5.3532	12.1853	0.2331	9.1599	0.0133
April	mean	33.4560	56.2952	4.6040	29.5750	0.7045
	variance	34.8010	420.0455	2.5640	291.9589	0.0119
May	mean	67.7667	112.6738	3.6960	18.4572	0.3580
	variance	180.9468	963.5634	0.6949	62.2062	0.0337
June	mean	147.2619	171.1940	2.3489	9.1192	0.5609
	variance	286.6152	650.2244	0.1291	6.1841	0.0145
July	mean	252.4405	217.8821	1.5107	5.2378	0.6776
	variance	548.4822	513.5991	0.0904	1.4989	0.0061
August	mean	319.2929	225.8893	0.9486	3.8926	0.6862
	variance	365.7542	350.0046	0.0708	0.7294	0.0045
September	mean	286.9702	174.3131	0.7367	3.1364	0.6275
	variance	476.4055	187.7879	0.0386	0.2754	0.0044
October	mean	229.2083	166.3774	1.0109	3.9858	0.6145
	variance	331.0162	211.6753	0.0620	0.7923	0.0069
November	mean	122.6512	96.8976	1.2412	4.2611	0.7158
	variance	119.8939	86.3537	0.0626	0.8497	0.0055
December	mean	62.4655	62.5429	2.2621	8.9375	0.7757
	variance	47.9845	84.0287	0.1997	9.3091	0.0044
Annual	mean	1585.1209	913.6495	1.0663	4.2516	0.0244
	variance	9891.6485	7368.6746	0.1126	1.5298	0.0123

SUMMARY STATISTICS FOR MURRUM DATA (Gl)
data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	40.4500	49.2179	3.0737	18.3725	0.4733
	variance	34.8551	329.1499	3.2453	286.3897	0.0159
February	mean	29.8452	24.1357	0.9403	3.8112	0.7361
	variance	6.6011	5.8291	0.1068	1.7172	0.0094
March	mean	38.9512	79.4226	4.8325	35.9630	0.5701
	variance	122.6139	3731.9242	7.9509	857.0850	0.0197
April	mean	52.0988	186.1417	5.9391	39.8395	0.2905
	variance	416.3399	4584.9119	3.3188	536.6802	0.0450
May	mean	122.9000	408.4857	3.7458	15.7494	0.1262
	variance	2267.7520	6723.8702	1.1164	75.5571	0.0291
June	mean	336.7643	810.1548	2.3296	6.6861	0.1636
	variance	8572.2392	12035.1042	0.3758	12.0786	0.0255
July	mean	384.4905	892.6345	2.6041	8.2861	0.3614
	variance	10823.4026	16819.5987	0.3018	9.7740	0.0220
August	mean	252.3488	482.7988	2.0927	5.8259	0.4723
	variance	2994.8461	3249.7813	0.1861	3.9399	0.0116
September	mean	254.2333	474.5310	2.4463	7.9848	0.5781
	variance	2927.1432	4303.3506	0.2240	8.4404	0.0106
October	mean	229.5940	407.4024	2.9090	11.8419	0.4721
	variance	2336.3377	5472.7945	0.3268	23.2848	0.0152
November	mean	94.5512	149.8214	2.3763	8.2519	0.7371
	variance	329.5731	490.8128	0.1909	8.4437	0.0063
December	mean	45.2214	66.7607	3.1148	14.2659	0.6414
	variance	59.0241	183.4521	0.2626	19.0866	0.0114
Annual	mean	1881.4296	2380.2431	1.8124	5.9769	0.1480
	variance	84116.1956	89672.3322	0.1320	4.1238	0.0139

SUMMARY STATISTICS FOR INFMEN DATA (Gl)
data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	199.6357	447.3393	3.6964	17.7047	0.5669
	variance	1938.3602	8308.4933	0.4522	43.9786	0.0136
February	mean	181.8286	355.6298	3.3834	15.7895	0.5985
	variance	1519.3199	5743.0578	0.5449	45.2419	0.0143
March	mean	266.9500	488.0798	3.0317	12.7197	0.4807
	variance	2946.6042	7419.1293	0.3442	23.2959	0.0234
April	mean	324.1762	528.0548	3.4686	18.8978	0.3844
	variance	2806.8452	19949.6589	1.2124	92.5003	0.0219
May	mean	303.2179	751.7810	3.7852	17.7404	0.3718
	variance	5464.0340	20439.3073	0.5269	54.4667	0.0215
June	mean	209.0298	597.3107	4.4115	23.5520	0.4896
	variance	4238.0125	20608.1239	1.1085	144.4099	0.0297
July	mean	259.7464	635.7440	3.6712	16.8254	0.5071
	variance	5678.0620	23558.6372	0.5041	43.7914	0.0339
August	mean	336.0012	716.4488	3.4247	15.3180	0.6310
	variance	5899.9553	24580.6083	0.4832	45.5809	0.0208
September	mean	354.2440	770.0131	3.4014	15.0699	0.6314
	variance	6992.9818	24395.0913	0.4736	43.4494	0.0183
October	mean	245.8119	533.8190	3.0698	11.9027	0.4997
	variance	3863.7399	8441.3095	0.3991	21.3729	0.0179
November	mean	208.9238	483.1917	3.1483	12.5810	0.5436
	variance	3466.6076	7979.5825	0.6909	53.6835	0.0204
December	mean	210.6083	478.7607	3.0252	11.4760	0.4389
	variance	2648.3682	5367.4545	0.4897	38.3729	0.0216
Annual	mean	3100.1777	3674.8479	2.1350	8.1203	0.1769
	variance	********	*********	0.2680	11.6205	0.0181

SUMMARY STATISTICS FOR MDBCGR DATA (GI)
data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	24.3917	17.3750	2.9185	12.6719	0.5380
	variance	2.7140	7.3364	0.2879	16.4450	0.0158
February	mean	18.3167	11.9036	3.1542	16.0935	0.3381
	variance	1.8103	10.6893	0.9869	57.0781	0.0235
March	mean	21.0631	15.3167	3.5772	17.6723	0.5136
	variance	2.2546	10.0889	0.5079	46.1840	0.0210
April	mean	26.4714	39.6512	5.4087	35.4792	0.2911
	variance	17.6025	191.6399	2.7062	395.8565	0.0394
May	mean	44.7000	89.4964	5.3038	35.1671	0.3691
	variance	122.1853	1682.5567	2.3024	301.5436	0.0491
June	mean	114.9274	261.4845	4.0944	20.5754	0.5668
	variance	1011.0895	4400.8081	1.1290	130.4151	0.0334
July	mean	207.8524	342.7714	2.6780	9.8551	0.7199
	variance	1587.4548	3312.4640	0.2400	10.5919	0.0105
August	mean	275.7488	361.6500	2.1682	7.4692	0.8328
	variance	1921.9223	2572.3445	0.1423	5.3345	0.0054
September	mean	274.0155	377.5476	2.4515	9.2547	0.8119
	variance	2440.8587	4339.5360	0.2162	9.7635	0.0036
October	mean	192.6940	314.6702	2.8399	10.8312	0.7306
	variance	1358.9736	2630.9142	0.2534	12.2314	0.0078
November	mean	99.3631	180.7821	3.2422	13.2954	0.6523
	variance	466.4412	1224.5694	0.5257	40.3552	0.0147
December	mean	53.5643	95.4036	4.2245	22.4651	0.5217
	variance	100.9869	601.2456	0.7784	98.8803	0.0285
Annual	mean	1353.0972	1583.9449	2.2995	8.5718	0.0519
	variance	41246.3489	66534.3709	0.2360	11.5636	0.0091

SUMMARY STATISTICS FOR MDRNDN DATA (mm)
data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	33.0631	41.8190	2.3277	9.5293	0.0890
	variance	14.1824	38.6673	0.2146	9.5619	0.0129
February	mean	25.8464	28.5250	1.6963	5.4848	0.0478
	variance	9.1873	10.0920	0.0526	1.1400	0.0125
March	mean	31.0262	33.9036	1.7734	6.0993	0.1283
	variance	9.3591	15.3290	0.0707	1.5987	0.0137
April	mean	28.4167	25.4167	1.1559	3.8144	0.0973
	variance	6.4322	4.2836	0.0405	0.4548	0.0136
May	mean	39.0655	30.2369	0.9962	3.4138	0.0821
	variance	8.9967	5.8754	0.0270	0.2509	0.0098
June	mean	42.3548	26.4571	0.7177	3.1090	0.0840
	variance	4.3977	4.5499	0.0412	0.2733	0.0146
July	mean	36.3143	24.0131	0.9995	3.7449	0.2562
	variance	5.5480	4.7296	0.0354	0.3789	0.0102
August	mean	37.4357	22.5262	0.8658	3.6919	0.1833
	variance	4.7247	3.6371	0.0766	0.7115	0.0111
September	mean	35.3298	22.8929	1.0265	3.6723	0.2329
	variance	7.1840	4.8997	0.0320	0.4621	0.0164
October	mean	40.6857	28.7690	0.9564	3.4004	0.2315
	variance	11.5111	5.5549	0.0462	0.3812	0.0114
November	mean	27.1631	25.6940	1.6954	6.0967	0.1182
	variance	6.9192	7.7844	0.1011	2.4573	0.0114
December	mean	30.5738	32.6393	1.8726	6.7257	0.1559
	variance	9.1562	18.0725	0.1001	2.8618	0.0133
Annual	mean	407.2703	124.4637	0.5114	3.1933	0.0913
	variance	150.7359	104.7074	0.0855	0.8503	0.0123

SUMMARY STATISTICS FOR MDRNKR DATA (mm)
data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	24.6786	28.6333	1.9563	7.1963	0.2632
	variance	6.8752	14.4820	0.1160	3.6881	0.0149
February	mean	25.1619	32.1214	2.2384	8.4808	0.0554
	variance	10.3699	21.5193	0.1722	7.8879	0.0137
March	mean	29.7548	32.2679	1.6002	5.1163	0.1431
	variance	6.6570	10.4788	0.0392	0.7002	0.0127
April	mean	24.4548	22.2524	1.3367	4.5201	0.0728
	variance	4.8220	3.1637	0.0619	0.9277	0.0136
May	mean	36.7917	27.5357	0.9960	3.8037	0.0030
	variance	10.7574	5.3936	0.0639	0.8162	0.0108
June	mean	37.5131	23.1548	0.8859	3.8871	0.2135
	variance	4.5043	4.6155	0.0808	0.6641	0.0116
July	mean	35.3929	21.1512	0.9534	3.8192	0.2765
	variance	5.0472	3.7425	0.0428	0.5344	0.0104
August	mean	37.3595	20.5321	0.6563	3.2402	0.2224
	variance	4.6114	2.6668	0.0600	0.5215	0.0115
September	mean	35.0214	21.8964	0.7479	3.1326	0.1759
	variance	5.8304	3.8548	0.0341	0.2241	0.0165
October	mean	39.7667	30.2905	1.1011	3.8841	0.3060
	variance	12.5495	8.6775	0.0484	0.4813	0.0147
November	mean	25.9310	19.7333	1.1914	4.5378	0.0691
	variance	2.9320	2.7336	0.0911	1.3884	0.0103
December	mean	25.4060	28.8583	2.0935	7.8744	0.0786
	variance	5.4714	12.8275	0.1383	4.9795	0.0108
Annual	mean	377.2470	109.8364	0.4607	3.1441	0.1347
	variance	120.7722	85.2950	0.0796	0.6014	0.0134

SUMMARY STATISTICS FOR MDRNTC DATA (mm)
data generated using only the lag 1 terms

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	34.3643	43.0952	2.2625	8.7231	0.0663
	variance	16.7633	30.9725	0.2167	8.6086	0.0153
February	mean	26.9560	35.7452	2.3196	8.6510	0.0687
	variance	14.4531	29.2276	0.1314	5.2673	0.0129
March	mean	36.4798	39.4012	1.8476	6.5214	0.1696
	variance	11.4607	24.1888	0.1090	2.5430	0.0124
April	mean	33.0107	29.7786	1.3180	4.3771	0.1932
	variance	9.9243	7.1576	0.0460	0.5826	0.0117
May	mean	42.0917	34.5107	1.2279	4.2266	0.0738
	variance	12.3487	12.7263	0.0520	0.6476	0.0095
June	mean	47.0369	28.5619	0.5139	2.7155	0.0740
	variance	6.0318	3.8850	0.0280	0.1112	0.0143
July	mean	41.4798	23.5012	0.5873	2.7912	0.2636
	variance	5.1881	2.5153	0.0254	0.1021	0.0101
August	mean	43.8607	23.9738	0.5252	2.9024	0.2092
	variance	4.2241	3.4215	0.0370	0.1934	0.0114
September	mean	38.0429	21.9786	0.7324	3.0740	0.1760
	variance	7.1297	2.8617	0.0283	0.2087	0.0158
October	mean	47.0381	34.5786	1.0597	3.9012	0.2607
	variance	20.1070	13.2299	0.0709	0.7384	0.0123
November	mean	31.1167	28.4393	1.4861	5.2645	0.1982
	variance	9.5082	9.6178	0.0674	1.4344	0.0104
December	mean	32.3155	33.6179	1.6239	5.5087	0.1151
	variance	7.6816	16.3171	0.0713	1.5625	0.0107
Annual	mean	453.7792	137.7073	0.4710	3.1580	0.1496
	variance	181.5562	140.9478	0.0963	0.6525	0.0134

Appendix J

Statistics – Shifted Log Transform

In this Appendix the abreviations used are defined below.

Abreviation	Full Title
Mean	Mean of the data.
St.Dev	Standard deviation of the data.
Cs.	Coefficient of skewness.
Ck.	Coefficient of kurtosis.
SC1	Lag 1 serial correlation coefficient.

SUMMARY STATISTICS FOR MDSNWY DATA (Gl)
data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	55.6393	34.1893	0.6428	3.4412	0.6813
	variance	9.6687	7.7453	0.0624	0.5109	0.0044
February	mean	64.6488	25.4690	0.5011	3.2857	0.6894
	variance	10.1061	3.7651	0.0722	0.4301	0.0037
March	mean	61.5405	25.3202	0.8448	3.8744	0.7046
	variance	7.7328	4.4942	0.0710	0.8407	0.0052
April	mean	54.1167	32.9940	0.3327	2.7248	0.5292
	variance	10.2633	4.8059	0.0370	0.0861	0.0063
May	mean	102.4000	50.2119	0.1231	1.8246	0.4418
	variance	36.1207	5.4726	0.0275	0.0218	0.0091
June	mean	91.7143	40.4310	0.1600	2.4964	0.4387
	variance	20.6039	7.8805	0.0317	0.0486	0.0088
July	mean	89.4143	37.5143	0.2171	2.6337	0.5044
	variance	17.6694	5.8562	0.0244	0.0637	0.0075
August	mean	75.5512	37.5667	0.1800	2.5210	0.4256
	variance	15.9917	6.8331	0.0226	0.0643	0.0079
September	mean	-22.9548	52.7488	0.6940	2.8848	0.2932
	variance	26.8917	15.9859	0.0248	0.1749	0.0107
October	mean	-48.5310	68.8012	0.3839	1.9499	0.4867
	variance	35.2622	11.0873	0.0200	0.0396	0.0065
November	mean	7.8917	63.8762	0.2715	1.8661	0.3605
	variance	35.8593	7.4392	0.0217	0.0203	0.0090
December	mean	40.6179	29.0488	0.8607	4.0532	0.3425
	variance	10.7494	7.0271	0.1235	1.7924	0.0079
Annual	mean	572.0497	240.8753	0.1438	2.7392	0.0390
	variance	640.3010	317.4444	0.0450	0.1382	0.0089

SUMMARY STATISTICS FOR MDMRGT DATA (Gl)
data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	17.0607	10.9905	1.3512	5.3047	0.6495
	variance	1.1325	1.7158	0.1046	2.0289	0.0070
February	mean	11.1167	6.4000	0.9783	3.8916	0.6290
	variance	0.6966	0.3911	0.0593	0.6680	0.0079
March	mean	12.1762	7.4286	1.3602	5.4506	0.5550
	variance	0.6826	0.7592	0.1456	3.2608	0.0087
April	mean	14.4940	10.8429	1.9158	8.2248	0.7446
	variance	1.5042	3.1420	0.5206	23.2170	0.0052
May	mean	22.4405	15.2929	1.8969	7.5730	0.5754
	variance	2.4024	4.5436	0.2032	7.1467	0.0078
June	mean	33.7655	25.2845	1.9758	7.8595	0.6512
	variance	5.9996	13.7736	0.2100	7.6480	0.0091
July	mean	47.5262	32.0000	1.2644	4.2290	0.6898
	variance	9.9142	10.9412	0.0373	0.6349	0.0063
August	mean	59.6690	35.2321	0.8866	3.8068	0.7194
	variance	11.1513	7.7058	0.0689	0.5951	0.0037
September	mean	69.5012	31.9512	0.6152	3.2269	0.7718
	variance	14.6548	7.7707	0.0538	0.3101	0.0030
October	mean	72.4476	37.2393	0.7906	3.7220	0.7057
	variance	17.4155	15.1848	0.0660	0.7174	0.0055
November	mean	44.9583	23.1298	0.6737	3.2717	0.6711
	variance	10.1294	4.1879	0.0378	0.2372	0.0059
December	mean	26.8845	15.3548	1.1550	4.7736	0.7627
	variance	3.9984	4.4025	0.1061	1.9303	0.0047
Annual	mean	432.0429	169.3129	0.7350	3.4804	0.1587
	variance	427.1000	243.4485	0.0631	0.5154	0.0099

SUMMARY STATISTICS FOR MDDART DATA (Gl)

data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	29.5179	20.9024	1.3825	4.6931	0.7042
	variance	5.4164	5.3176	0.0488	0.7756	0.0055
February	mean	20.2476	14.3821	1.4846	5.2766	0.6057
	variance	3.0408	2.4622	0.0719	1.5919	0.0071
March	mean	21.4845	16.1452	1.9483	8.2391	0.6878
	variance	3.2678	6.1321	0.4435	17.2753	0.0053
April	mean	27.5452	25.8786	2.7618	13.6032	0.7230
	variance	10.6844	44.2723	1.1865	89.8692	0.0066
May	mean	44.9750	39.2310	2.3560	9.9093	0.5374
	variance	14.6012	35.7079	0.2804	12.7380	0.0117
June	mean	77.6821	70.5012	2.1393	8.1019	0.6583
	variance	37.4781	87.3394	0.1361	4.1432	0.0083
July	mean	110.7655	87.4476	1.5864	5.3654	0.6485
	variance	67.4269	102.9963	0.0460	0.9954	0.0094
August	mean	136.9286	86.7286	1.2450	4.5918	0.6602
	variance	65.6356	61.4409	0.0658	0.7616	0.0052
September	mean	155.1024	77.3095	0.8739	3.8997	0.6415
	variance	109.3740	65.7059	0.1123	1.1955	0.0065
October	mean	154.3798	85.0762	1.1824	5.0395	0.6761
	variance	116.1262	133.2604	0.1808	3.9280	0.0065
November	mean	90.0952	55.2476	1.0296	3.7906	0.7316
	variance	54.4308	32.8001	0.0451	0.5134	0.0051
December	mean	49.5583	31.2869	1.3060	4.9693	0.7526
	variance	15.8858	16.8525	0.0903	1.5663	0.0039
Annual	mean	918.2972	410.0611	0.9677	3.9704	0.1082
	variance	2467.9018	1690.7373	0.0664	0.9943	0.0104

SUMMARY STATISTICS FOR MDHUME DATA (Gl)
data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	140.7881	97.1095	1.7619	7.1438	0.7400
	variance	140.5413	237.2035	0.2083	7.3900	0.0046
February	mean	88.6560	52.6333	1.0723	4.0104	0.6587
	variance	44.1938	29.2835	0.0708	0.8045	0.0070
March	mean	94.3024	59.3190	1.5009	5.9968	0.6098
	variance	38.7981	49.9748	0.1653	4.0699	0.0066
April	mean	121.0476	96.6536	2.3817	10.8651	0.7421
	variance	137.8348	384.5558	0.7829	49.0364	0.0056
May	mean	197.3345	154.7595	2.2305	9.3609	0.5212
	variance	219.1211	563.7959	0.3405	14.9220	0.0090
June	mean	329.1214	283.7214	2.1839	8.5931	0.6552
	variance	624.1846	1498.8376	0.1750	6.3085	0.0085
July	mean	479.9107	367.6060	1.4683	4.7856	0.6618
	variance	1203.5687	1600.9251	0.0504	0.8950	0.0080
August	mean	597.7500	392.6845	1.0071	3.9820	0.7143
	variance	1272.8955	1037.1587	0.0719	0.6802	0.0042
September	mean	687.2833	350.7702	0.9147	3.8145	0.6972
	variance	2172.1886	1365.9992	0.0837	0.7661	0.0045
October	mean	708.2488	400.4750	1.2310	5.0030	0.6998
	variance	2588.9731	2380.8573	0.0990	2.3004	0.0059
November	mean	416.9750	238.7131	0.7340	3.1067	0.7767
	variance	1056.2879	330.6339	0.0268	0.1938	0.0047
December	mean	230.7452	138.8762	1.2237	4.6746	0.7729
	variance	357.9820	324.7038	0.0694	0.9272	0.0038
Annual	mean	4092.1697	1830.2378	0.9134	3.7655	0.1089
	variance	50830.6079	31600.9392	0.0600	0.7135	0.0099

SUMMARY STATISTICS FOR MDKIEW DATA (Gl)
data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	18.6774	13.4131	1.3514	5.3821	0.6525
	variance	2.7729	2.6999	0.1321	3.2702	0.0062
February	mean	12.4048	9.6440	1.6608	6.6426	0.6231
	variance	1.5701	1.7741	0.1749	4.7340	0.0065
March	mean	14.4357	12.2905	1.5216	5.6179	0.4405
	variance	1.6544	2.2481	0.1196	1.9539	0.0100
April	mean	19.2869	16.7893	2.0792	9.0355	0.6018
	variance	3.6091	9.4465	0.6020	38.4120	0.0104
May	mean	33.7750	27.3440	2.0092	8.3786	0.4380
	variance	7.3195	16.6729	0.3459	14.3151	0.0131
June	mean	50.9274	38.2476	1.9542	7.5594	0.6384
	variance	11.0333	20.5551	0.1506	5.4603	0.0082
July	mean	69.6214	47.6583	1.5473	5.7015	0.6793
	variance	22.7152	32.3788	0.1238	3.3837	0.0073
August	mean	81.2738	49.2143	0.8351	3.4439	0.7076
	variance	21.6044	12.5653	0.0506	0.2967	0.0032
September	mean	99.4274	48.7202	0.9797	4.0645	0.7125
	variance	40.7663	26.0445	0.0839	0.8845	0.0043
October	mean	102.9607	54.0452	1.1282	4.6505	0.7257
	variance	43.7207	33.9912	0.1046	1.7875	0.0052
November	mean	62.4714	33.8536	0.6089	2.9083	0.7797
	variance	19.7223	4.6613	0.0269	0.1169	0.0046
December	mean	31.0690	18.9107	0.9243	3.6267	0.7486
	variance	7.2692	3.3477	0.0358	0.3248	0.0037
Annual	mean	596.3196	248.4315	0.8529	3.6520	0.1651
	variance	927.0849	448.6762	0.0700	0.7103	0.0105

SUMMARY STATISTICS FOR HUNREG DATA (Gl)
data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	87.8095	65.5333	1.8997	7.8745	0.7419
	variance	67.6406	122.1888	0.3068	12.9078	0.0045
February	mean	54.6060	34.0702	1.1256	4.2019	0.7089
	variance	18.7463	14.4498	0.0653	0.7981	0.0065
March	mean	56.2143	36.4357	1.5277	6.1120	0.5750
	variance	15.3094	19.9276	0.1680	4.4785	0.0074
April	mean	70.5429	56.7381	2.3763	10.7717	0.7457
	variance	45.9471	125.2137	0.7142	38.8297	0.0055
May	mean	116.2345	95.1083	2.3661	10.4060	0.5115
	variance	90.2505	259.2521	0.4630	22.8112	0.0115
June	mean	204.8464	190.3357	2.3335	9.3332	0.6586
	variance	283.8502	787.8505	0.2179	8.7464	0.0090
July	mean	317.7940	267.8714	1.6831	5.6523	0.6618
	variance	675.7085	1094.4230	0.0556	1.5709	0.0080
August	mean	397.5500	284.4952	1.0165	4.1157	0.7085
	variance	643.1965	616.4315	0.1000	1.1596	0.0045
September	mean	421.2690	243.2452	1.0515	4.0696	0.7092
	variance	1062.0499	697.5040	0.0782	0.8220	0.0040
October	mean	425.4333	271.4071	1.4144	5.4613	0.7217
	variance	1224.0172	1349.4089	0.0878	1.8117	0.0055
November	mean	255.5095	154.5738	0.7749	3.0953	0.7809
	variance	443.0108	151.9176	0.0265	0.2187	0.0040
December	mean	142.9095	94.0131	1.3616	5.2227	0.7691
	variance	175.2223	172.2356	0.0771	1.3732	0.0037
Annual	mean	2550.7188	1261.2419	1.0168	4.0140	0.1028
	variance	23915.9951	16176.1897	0.0705	0.9726	0.0097

SUMMARY STATISTICS FOR OVENMD DATA (Gl)
data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	26.9619	25.1202	1.9629	7.5262	0.7773
	variance	10.2944	14.5763	0.1563	5.3572	0.0058
February	mean	16.4536	20.7214	3.0345	14.7548	0.6032
	variance	6.2596	18.4236	0.5617	39.7224	0.0113
March	mean	18.8940	20.5786	2.4004	9.9400	0.6302
	variance	6.0921	12.3880	0.2542	12.6505	0.0138
April	mean	31.3095	43.0702	3.3952	18.3537	0.7357
	variance	30.1838	140.1691	1.8160	182.3060	0.0075
May	mean	61.7440	86.8464	3.2172	15.7594	0.3744
	variance	75.2490	389.9218	0.7812	56.3243	0.0194
June	mean	141.6369	168.1250	2.4791	9.8722	0.5674
	variance	171.0050	557.4221	0.1858	9.6923	0.0132
July	mean	247.6595	218.9929	1.6947	6.0662	0.6680
	variance	423.1097	647.0354	0.0834	1.9595	0.0085
August	mean	317.9357	226.1440	0.9605	3.9015	0.6889
	variance	384.6541	332.8365	0.0730	0.8302	0.0047
September	mean	279.2655	172.9726	0.8298	3.4212	0.6394
	variance	545.2948	247.6979	0.0551	0.3268	0.0043
October	mean	222.4893	163.1298	1.0445	4.0813	0.5996
	variance	386.6899	317.9298	0.0709	1.0216	0.0061
November	mean	118.6929	95.6190	1.4463	4.9660	0.7147
	variance	170.9346	130.5331	0.0596	1.0389	0.0046
December	mean	62.5583	62.9155	2.1293	8.2171	0.7830
	variance	87.5140	129.3148	0.1719	7.2959	0.0045
Annual	mean	1545.6068	886.6617	1.0405	4.0491	0.0284
	variance	9911.6722	7046.2212	0.0773	0.9085	0.0097

SUMMARY STATISTICS FOR MURRUM DATA (Gl)
data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	40.2881	45.1583	2.1143	9.3299	0.4290
	variance	24.7589	87.0547	0.8859	59.7030	0.0164
February	mean	29.3690	23.7810	1.0231	4.1745	0.7627
	variance	6.6349	5.5613	0.1034	1.5433	0.0050
March	mean	36.5345	45.9345	2.8304	14.1678	0.5981
	variance	33.7808	155.4341	1.2102	91.4472	0.0103
April	mean	36.2440	72.8310	4.4779	28.3290	0.4931
	variance	64.3321	873.5292	2.5359	314.5510	0.0273
May	mean	30.9405	87.1202	5.4805	37.6446	0.4380
	variance	129.1791	3014.5245	3.1595	465.1408	0.0458
June	mean	133.6369	376.3702	4.5703	25.5124	0.3721
	variance	1846.3918	12700.4614	1.1355	151.6231	0.0397
July	mean	277.2702	659.7369	3.4739	15.2356	0.4371
	variance	5959.6684	18924.4183	0.8023	77.8427	0.0279
August	mean	225.4429	421.9500	2.3629	7.5120	0.5017
	variance	3130.8261	4081.9833	0.2722	8.2587	0.0196
September	mean	244.0060	462.0048	2.5885	8.9006	0.6196
	variance	4365.4570	6228.6168	0.3600	13.1778	0.0122
October	mean	213.6833	378.6810	2.9080	11.9778	0.4463
	variance	2904.7277	7339.1305	0.2732	17.9757	0.0162
November	mean	89.8750	143.0893	2.4311	8.6933	0.7335
	variance	405.1412	649.5104	0.2308	10.0919	0.0061
December	mean	43.4881	60.3905	2.7925	12.6761	0.6873
	variance	63.3866	138.7898	0.3941	26.0574	0.0066
Annual	mean	1400.7594	1797.1902	2.1904	7.8880	0.1344
	variance	64110.8314	99999.9999	0.2107	8.3551	0.0131

SUMMARY STATISTICS FOR INFMEN DATA (Gl)
data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	185.3952	439.7155	3.9496	19.5826	0.5481
	variance	2169.4383	10600.7218	0.5812	58.8740	0.0268
February	mean	174.5857	358.6952	3.7274	18.3040	0.5886
	variance	1596.5986	6331.9472	0.4730	43.8880	0.0252
March	mean	267.5345	510.8726	3.0609	12.4668	0.4289
	variance	3283.8329	8981.7892	0.3498	20.4916	0.0220
April	mean	317.5071	476.2250	2.7142	12.6704	0.4008
	variance	2293.4445	11484.0959	0.8495	62.1627	0.0177
May	mean	278.3774	697.7667	3.9751	19.8880	0.3870
	variance	7841.9203	32595.5618	0.8704	97.2866	0.0267
June	mean	149.6167	420.9845	4.7670	28.0719	0.4647
	variance	2756.1048	22760.0151	1.1650	162.4365	0.0309
July	mean	250.0286	620.4893	3.7478	17.4890	0.5009
	variance	5976.8230	24898.8757	0.6715	68.2612	0.0302
August	mean	318.5667	708.4619	3.6411	16.8733	0.6228
	variance	5390.6145	21670.8368	0.3814	32.2510	0.0218
September	mean	328.9024	749.5298	3.6170	16.6462	0.5893
	variance	8012.8641	27828.1961	0.6138	58.5706	0.0198
October	mean	220.5524	500.2440	3.2644	13.2700	0.4625
	variance	2543.3134	7828.2353	0.3283	21.6722	0.0243
November	mean	165.6119	403.8512	3.6711	16.7888	0.5754
	variance	1980.9806	7755.0596	0.6266	62.5246	0.0225
December	mean	175.9857	414.9464	3.3842	14.1905	0.4836
	variance	2565.2687	8676.3302	0.4229	29.1954	0.0282
Annual	mean	2832.6822	3348.6572	2.1499	8.2204	0.1640
	variance	99999.9999	99999.9999	0.2694	10.0127	0.0156

SUMMARY STATISTICS FOR MDBCGR DATA (GI)
data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	23.9952	15.7667	2.8136	12.6613	0.5586
	variance	3.5523	9.8847	0.4163	23.1828	0.0193
February	mean	18.1690	10.1571	2.4095	11.5365	0.4029
	variance	1.5482	4.1251	0.7108	42.3054	0.0173
March	mean	20.2738	12.3345	3.1991	15.8973	0.5547
	variance	2.1523	8.8888	0.7719	54.8506	0.0169
April	mean	22.1845	15.3262	2.7742	13.8040	0.4333
	variance	3.4006	20.4716	1.2759	101.9296	0.0197
May	mean	37.2690	45.4714	3.5079	19.6453	0.5574
	variance	25.7899	268.8481	2.0391	207.0560	0.0147
June	mean	87.3500	181.3440	4.6618	27.6054	0.5641
	variance	324.0613	2527.8871	1.1630	158.0234	0.0209
July	mean	197.1583	337.3071	2.8841	11.0604	0.7170
	variance	1358.6511	2928.1906	0.2427	11.8791	0.0106
August	mean	262.7190	359.8762	2.3624	8.3669	0.8276
	variance	1624.3669	2691.1794	0.1451	5.6600	0.0057
September	mean	264.6357	387.0560	2.6231	9.9864	0.7845
	variance	2533.5850	4488.1921	0.2032	9.3219	0.0057
October	mean	183.5250	296.8226	2.8831	11.4403	0.6969
	variance	1833.6771	4091.6830	0.3029	18.3401	0.0104
November	mean	89.1226	141.1429	3.3242	15.1419	0.6762
	variance	410.1608	1131.3126	0.5678	46.2653	0.0140
December	mean	49.3452	75.1345	4.0965	22.4978	0.5864
	variance	97.5767	459.9635	0.8524	82.8516	0.0232
Annual	mean	1255.7426	1448.5519	2.2878	8.3089	0.0594
	variance	35599.9257	61570.8018	0.1924	7.3306	0.0121

SUMMARY STATISTICS FOR MDRNDN DATA (mm)
data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	32.1881	39.0571	2.1330	8.7794	0.0925
	variance	14.5237	41.4087	0.3108	12.6096	0.0119
February	mean	25.2440	28.2476	1.8222	6.0222	0.0246
	variance	7.6791	9.8601	0.0624	1.6920	0.0108
March	mean	30.9143	34.1286	1.9026	6.6492	0.1413
	variance	13.9227	18.3317	0.0871	2.2067	0.0105
April	mean	27.9000	24.8810	1.2675	4.1861	0.0736
	variance	6.1687	4.6623	0.0407	0.6517	0.0117
May	mean	38.4405	29.7250	1.0909	3.7516	0.0942
	variance	8.6979	5.7542	0.0381	0.4360	0.0090
June	mean	41.2488	25.5988	0.7834	3.3864	0.0703
	variance	5.7220	5.1040	0.0420	0.2785	0.0166
July	mean	36.1917	24.7548	1.0600	3.8381	0.2425
	variance	4.7786	4.7201	0.0602	0.5639	0.0081
August	mean	37.3405	22.4810	0.9192	3.8510	0.2216
	variance	5.7314	4.9425	0.0614	0.6698	0.0106
September	mean	34.8429	22.7167	1.1072	3.9887	0.2462
	variance	5.4227	3.7722	0.0456	0.4224	0.0099
October	mean	39.1964	27.8869	1.0357	3.6377	0.1990
	variance	11.4322	6.4968	0.0383	0.3715	0.0106
November	mean	27.1881	26.3381	1.8972	7.0613	0.0976
	variance	8.5324	11.9125	0.0985	3.3628	0.0112
December	mean	31.5762	34.2095	1.9774	7.1366	0.1546
	variance	11.3262	19.4052	0.0962	3.0958	0.0136
Annual	mean	402.2748	122.1747	0.4798	3.0543	0.0877
	variance	198.4631	99.2741	0.0569	0.3463	0.0096

SUMMARY STATISTICS FOR MDRNKR DATA (mm)
data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	24.6298	28.0643	1.9264	7.1160	0.2457
	variance	6.4959	11.6353	0.0992	2.8515	0.0128
February	mean	24.9905	32.7155	2.3804	9.1298	0.0211
	variance	11.2910	23.8948	0.1150	5.0489	0.0140
March	mean	29.9524	33.0190	1.6931	5.4354	0.1596
	variance	10.3259	14.5182	0.0572	1.4048	0.0101
April	mean	24.1357	22.0333	1.4471	4.9458	0.0571
	variance	4.6710	4.8456	0.0424	0.6417	0.0124
May	mean	36.5440	27.3071	1.0977	4.2124	-0.0198
	variance	10.0565	7.4684	0.0811	0.9630	0.0072
June	mean	36.3167	22.3679	0.8143	3.7743	0.1986
	variance	5.0691	4.0027	0.0818	0.9504	0.0129
July	mean	35.2655	22.1917	1.0737	4.1278	0.2813
	variance	4.3690	3.9374	0.0695	0.8348	0.0088
August	mean	36.6440	20.3000	0.7862	3.5525	0.2324
	variance	5.6100	2.8537	0.0574	0.4600	0.0083
September	mean	34.5286	21.2869	0.8303	3.4970	0.1867
	variance	4.9657	2.4665	0.0416	0.2948	0.0107
October	mean	38.8190	29.7607	1.2602	4.5213	0.2663
	variance	11.5485	9.0347	0.0497	0.9052	0.0117
November	mean	25.9607	20.1857	1.2834	4.7357	0.0272
	variance	4.0248	4.8644	0.0751	1.0072	0.0128
December	mean	26.0631	30.2750	2.1234	7.7085	0.0882
	variance	7.0754	21.3144	0.1182	4.3647	0.0104
Annual	mean	373.8530	108.9184	0.5121	3.1847	0.1037
	variance	168.1926	80.4824	0.0640	0.4988	0.0107

SUMMARY STATISTICS FOR MDRNTC DATA (mm)
data transformed using three parameter log transform

		Mean	St.Dev.	Cs.	Ck.	SC1
January	mean	35.1131	44.5155	2.3261	8.8705	0.0682
	variance	32.6479	64.7047	0.1892	8.2560	0.0111
February	mean	26.7083	36.6179	2.4590	9.3092	0.0785
	variance	15.8699	30.9181	0.1371	6.7979	0.0139
March	mean	36.1464	40.0619	1.9673	6.9575	0.1915
	variance	18.8830	28.3547	0.1014	3.0652	0.0143
April	mean	32.3083	29.2060	1.4282	4.8036	0.1713
	variance	7.2085	7.4866	0.0388	0.7260	0.0119
May	mean	41.3655	34.4083	1.4367	5.0817	0.0861
	variance	14.2223	12.4996	0.0865	1.4148	0.0109
June	mean	45.9036	28.1440	0.5455	2.8458	0.0368
	variance	8.1852	4.7724	0.0273	0.2057	0.0140
July	mean	41.0262	23.9464	0.6365	2.8573	0.2527
	variance	4.1485	2.9194	0.0248	0.1287	0.0070
August	mean	43.6917	24.3333	0.5694	3.0306	0.2328
	variance	5.7256	3.2504	0.0435	0.1673	0.0083
September	mean	37.5452	21.4440	0.7807	3.4004	0.1776
	variance	5.8032	2.8647	0.0507	0.3644	0.0116
October	mean	44.9560	33.6762	1.2723	4.7035	0.2270
	variance	20.1943	14.6030	0.0755	1.0319	0.0134
November	mean	30.7655	29.1440	1.7082	6.0906	0.1626
	variance	11.8748	13.4367	0.0835	2.0672	0.0145
December	mean	33.2274	34.7202	1.7627	6.1071	0.1125
	variance	10.6524	15.4127	0.0818	1.7199	0.0110
Annual	mean	448.7672	137.4328	0.5326	3.2447	0.1300
	variance	296.2285	114.9186	0.0610	0.5597	0.0101

Appendix K

River Murray Failure Probability

The following tables give the various occurrance probabilities of the specified events.

The first five tables investigate total active system storage (Dartmouth, Hume, Menindee and Lake Victoria) and the remaining tables depict water supplied to each state.

Total Active System Storage (July 31^{st}, Year(I)	TOTAL ACTIVE SYSTEM STORAGE (thousands of Gl.) at the end of May in year(I+1)																	
	> 0	> 1.0	> 1.5	> 2.0	> 2.5	> 3.0	> 3.5	> 4.0	> 4.5	> 5.0	> 5.5	> 6.0	> 6.5	> 7.0	> 7.5	> 8.0	> 8.5	> 9.0
Gl.	probability of occurrance																	
< 1000	1.00	0.46	0.38	0.31	0.15	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1001-1500	1.00	0.67	0.56	0.56	0.44	0.26	0.15	0.11	0.11	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1501-2000	1.00	0.77	0.57	0.50	0.40	0.33	0.23	0.13	0.07	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001-2500	1.00	0.73	0.65	0.62	0.46	0.38	0.31	0.19	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2501-3000	1.00	0.81	0.79	0.70	0.55	0.40	0.34	0.17	0.11	0.06	0.04	0.04	0.02	0.02	0.00	0.00	0.00	0.00
3001-3500	1.00	0.94	0.87	0.73	0.58	0.46	0.35	0.21	0.17	0.12	0.08	0.04	0.02	0.00	0.00	0.00	0.00	0.00
3501-4000	1.00	0.92	0.87	0.79	0.71	0.59	0.49	0.40	0.29	0.22	0.17	0.10	0.08	0.05	0.02	0.01	0.00	0.00
4001-4500	1.00	0.99	0.95	0.90	0.85	0.79	0.71	0.61	0.52	0.37	0.28	0.15	0.12	0.06	0.04	0.02	0.01	0.00
4501-5000	1.00	1.00	0.98	0.95	0.94	0.84	0.75	0.64	0.54	0.40	0.28	0.22	0.15	0.07	0.04	0.03	0.02	0.00
5001-5500	1.00	1.00	1.00	0.96	0.94	0.90	0.80	0.70	0.59	0.50	0.40	0.30	0.22	0.13	0.08	0.03	0.01	0.00
5501-6000	1.00	1.00	1.00	0.98	0.97	0.94	0.87	0.81	0.71	0.60	0.45	0.35	0.27	0.15	0.08	0.04	0.02	0.00
6001-6500	1.00	1.00	1.00	1.00	0.99	0.94	0.89	0.81	0.70	0.58	0.50	0.37	0.30	0.19	0.08	0.02	0.01	0.01
6501-7000	1.00	1.00	1.00	1.00	1.00	0.98	0.93	0.90	0.82	0.72	0.64	0.49	0.36	0.22	0.13	0.05	0.02	0.00
7001-7500	1.00	1.00	1.00	1.00	1.00	0.99	0.97	0.94	0.88	0.82	0.72	0.58	0.44	0.26	0.13	0.04	0.01	0.00
7501-8000	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.98	0.98	0.91	0.84	0.72	0.54	0.39	0.23	0.09	0.05	0.02
8001-8500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.98	0.94	0.87	0.77	0.57	0.39	0.19	0.08	0.03	0.00
8501-9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.94	0.86	0.63	0.48	0.25	0.07	0.04	0.01
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.69	0.31	0.15	0.08	0.00

Total Active System Storage (July 31st, Year(I)	TOTAL ACTIVE SYSTEM STORAGE (thousands of Gl.) at the end of May in year(I+2)																	
	> 0	> 1.0	> 1.5	> 2.0	> 2.5	> 3.0	> 3.5	> 4.0	> 4.5	> 5.0	> 5.5	> 6.0	> 6.5	> 7.0	> 7.5	> 8.0	> 8.5	> 9.0
Gl.	probability of occurrance																	
< 1000	1.00	0.85	0.69	0.62	0.46	0.38	0.38	0.23	0.15	0.15	0.15	0.08	0.00	0.00	0.00	0.00	0.00	0.00
1001-1500	1.00	0.74	0.67	0.59	0.52	0.52	0.44	0.41	0.22	0.11	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1501-2000	1.00	0.87	0.80	0.77	0.63	0.40	0.30	0.30	0.23	0.17	0.07	0.03	0.03	0.00	0.00	0.00	0.00	0.00
2001-2500	1.00	0.88	0.81	0.77	0.65	0.54	0.46	0.35	0.27	0.19	0.15	0.15	0.04	0.04	0.00	0.00	0.00	0.00
2501-3000	1.00	0.85	0.81	0.81	0.66	0.55	0.49	0.40	0.36	0.21	0.19	0.13	0.11	0.09	0.02	0.02	0.00	0.00
3001-3500	1.00	0.83	0.81	0.75	0.69	0.67	0.62	0.54	0.42	0.27	0.19	0.13	0.08	0.06	0.06	0.04	0.00	0.00
3501-4000	1.00	0.97	0.91	0.87	0.79	0.74	0.70	0.57	0.53	0.45	0.35	0.26	0.21	0.14	0.07	0.03	0.00	0.00
4001-4500	1.00	0.95	0.93	0.89	0.87	0.80	0.73	0.68	0.63	0.54	0.44	0.36	0.24	0.11	0.07	0.04	0.01	0.00
4501-5000	1.00	0.98	0.94	0.90	0.90	0.88	0.78	0.69	0.59	0.52	0.43	0.34	0.30	0.19	0.08	0.03	0.02	0.00
5001-5500	1.00	0.99	0.99	0.98	0.95	0.86	0.78	0.71	0.64	0.53	0.47	0.36	0.27	0.19	0.09	0.03	0.03	0.00
5501-6000	1.00	0.98	0.98	0.97	0.96	0.92	0.86	0.81	0.73	0.66	0.52	0.41	0.32	0.21	0.12	0.07	0.04	0.01
6001-6500	1.00	0.99	0.98	0.95	0.94	0.90	0.86	0.81	0.74	0.63	0.54	0.45	0.35	0.24	0.13	0.04	0.01	0.00
6501-7000	1.00	0.99	0.98	0.95	0.92	0.89	0.87	0.80	0.73	0.66	0.57	0.46	0.32	0.20	0.07	0.04	0.00	0.00
7001-7500	1.00	1.00	1.00	0.99	0.98	0.93	0.87	0.82	0.79	0.72	0.65	0.53	0.38	0.25	0.11	0.05	0.02	0.00
7501-8000	1.00	1.00	0.99	0.99	0.98	0.98	0.96	0.92	0.87	0.78	0.69	0.56	0.39	0.25	0.16	0.05	0.03	0.01
8001-8500	1.00	1.00	1.00	1.00	1.00	0.99	0.95	0.93	0.87	0.80	0.77	0.64	0.53	0.35	0.22	0.06	0.04	0.01
8501-9000	1.00	1.00	1.00	0.99	0.99	0.96	0.93	0.90	0.83	0.77	0.69	0.62	0.45	0.30	0.15	0.03	0.01	0.01
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.77	0.62	0.54	0.38	0.31	0.08	0.00	0.00

Total Active System Storage (July 31st, Year(I)	TOTAL ACTIVE SYSTEM STORAGE (thousands of Gl.) at the end of May in year(I+3)																	
	> 0	> 1.0	> 1.5	> 2.0	> 2.5	> 3.0	> 3.5	> 4.0	> 4.5	> 5.0	> 5.5	> 6.0	> 6.5	> 7.0	> 7.5	> 8.0	> 8.5	> 9.0
Gl.	probability of occurrance																	
< 1000	1.00	0.85	0.77	0.69	0.54	0.54	0.46	0.38	0.23	0.23	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.00
1001-1500	1.00	1.00	0.96	0.93	0.89	0.78	0.70	0.67	0.56	0.44	0.26	0.19	0.19	0.00	0.00	0.00	0.00	0.00
1501-2000	1.00	0.87	0.80	0.73	0.67	0.67	0.57	0.50	0.47	0.37	0.23	0.20	0.10	0.10	0.07	0.07	0.07	0.00
2001-2500	1.00	0.88	0.81	0.81	0.81	0.73	0.62	0.46	0.42	0.23	0.19	0.15	0.12	0.08	0.04	0.04	0.00	0.00
2501-3000	1.00	0.89	0.85	0.83	0.74	0.62	0.57	0.51	0.36	0.28	0.19	0.17	0.11	0.06	0.02	0.02	0.00	0.00
3001-3500	1.00	0.90	0.90	0.87	0.77	0.69	0.62	0.56	0.54	0.46	0.35	0.25	0.17	0.12	0.08	0.02	0.00	0.00
3501-4000	1.00	0.95	0.91	0.87	0.86	0.80	0.78	0.71	0.62	0.47	0.39	0.32	0.22	0.16	0.05	0.02	0.00	0.00
4001-4500	1.00	0.98	0.94	0.92	0.88	0.80	0.76	0.72	0.66	0.61	0.51	0.34	0.24	0.14	0.06	0.03	0.01	0.00
4501-5000	1.00	0.98	0.98	0.93	0.89	0.86	0.80	0.76	0.67	0.63	0.54	0.41	0.33	0.19	0.09	0.05	0.03	0.00
5001-5500	1.00	0.97	0.96	0.94	0.89	0.84	0.78	0.74	0.69	0.62	0.55	0.43	0.35	0.25	0.14	0.07	0.02	0.00
5501-6000	1.00	0.98	0.97	0.96	0.95	0.94	0.89	0.82	0.74	0.60	0.54	0.46	0.32	0.18	0.09	0.02	0.01	0.01
6001-6500	1.00	0.98	0.96	0.94	0.92	0.87	0.84	0.75	0.69	0.61	0.54	0.46	0.34	0.20	0.12	0.05	0.02	0.00
6501-7000	1.00	0.97	0.96	0.95	0.92	0.89	0.87	0.82	0.78	0.71	0.63	0.51	0.36	0.20	0.09	0.03	0.02	0.01
7001-7500	1.00	0.99	0.98	0.96	0.96	0.91	0.86	0.78	0.73	0.65	0.58	0.49	0.37	0.26	0.12	0.04	0.02	0.01
7501-8000	1.00	0.99	0.98	0.97	0.96	0.91	0.84	0.79	0.73	0.67	0.57	0.47	0.34	0.21	0.14	0.06	0.03	0.02
8001-8500	1.00	1.00	1.00	0.99	0.98	0.95	0.88	0.85	0.81	0.74	0.64	0.52	0.44	0.32	0.17	0.06	0.03	0.00
8501-9000	1.00	0.99	0.99	0.99	0.96	0.96	0.94	0.93	0.86	0.77	0.72	0.58	0.45	0.31	0.21	0.07	0.03	0.00
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.54	0.38	0.38	0.31	0.31	0.23	0.00	0.00	0.00

Total Active System Storage (July 31st, Year(I))	TOTAL ACTIVE SYSTEM STORAGE (thousands of Gl.) at the end of May in year(I+4)																	
	> 0	> 1.0	> 1.5	> 2.0	> 2.5	> 3.0	> 3.5	> 4.0	> 4.5	> 5.0	> 5.5	> 6.0	> 6.5	> 7.0	> 7.5	> 8.0	> 8.5	> 9.0
Gl.	probability of occurrance																	
< 1000	1.00	0.85	0.77	0.69	0.62	0.62	0.62	0.62	0.46	0.31	0.23	0.15	0.08	0.00	0.00	0.00	0.00	0.00
1001-1500	1.00	1.00	1.00	0.96	0.81	0.81	0.78	0.74	0.70	0.63	0.52	0.37	0.26	0.22	0.07	0.07	0.07	0.00
1501-2000	1.00	0.90	0.87	0.83	0.73	0.73	0.67	0.63	0.60	0.50	0.40	0.30	0.27	0.13	0.07	0.07	0.00	0.00
2001-2500	1.00	1.00	1.00	0.96	0.88	0.81	0.69	0.65	0.58	0.42	0.35	0.23	0.15	0.15	0.15	0.12	0.04	0.00
2501-3000	1.00	0.89	0.89	0.89	0.89	0.81	0.66	0.60	0.55	0.47	0.30	0.23	0.17	0.04	0.00	0.00	0.00	0.00
3001-3500	1.00	0.92	0.90	0.87	0.83	0.79	0.77	0.69	0.58	0.50	0.38	0.35	0.29	0.19	0.08	0.02	0.00	0.00
3501-4000	1.00	0.97	0.93	0.89	0.87	0.79	0.74	0.66	0.62	0.57	0.51	0.41	0.28	0.15	0.09	0.02	0.00	0.00
4001-4500	1.00	0.93	0.92	0.88	0.86	0.81	0.75	0.72	0.66	0.57	0.53	0.42	0.34	0.18	0.08	0.06	0.03	0.02
4501-5000	1.00	1.00	0.96	0.94	0.88	0.85	0.77	0.74	0.67	0.60	0.51	0.41	0.30	0.19	0.08	0.06	0.03	0.01
5001-5500	1.00	0.97	0.96	0.92	0.90	0.86	0.82	0.77	0.69	0.58	0.54	0.42	0.33	0.19	0.11	0.02	0.00	0.00
5501-6000	1.00	0.98	0.98	0.96	0.94	0.89	0.87	0.81	0.73	0.63	0.54	0.40	0.29	0.25	0.12	0.06	0.03	0.00
6001-6500	1.00	0.98	0.96	0.93	0.91	0.86	0.83	0.79	0.72	0.65	0.56	0.46	0.33	0.19	0.09	0.02	0.01	0.00
6501-7000	1.00	0.97	0.96	0.95	0.93	0.88	0.81	0.77	0.72	0.66	0.57	0.48	0.35	0.21	0.12	0.05	0.02	0.01
7001-7500	1.00	0.99	0.97	0.96	0.95	0.93	0.87	0.78	0.71	0.64	0.53	0.45	0.32	0.18	0.11	0.04	0.02	0.00
7501-8000	1.00	0.97	0.97	0.95	0.92	0.87	0.83	0.77	0.72	0.62	0.54	0.45	0.36	0.26	0.15	0.04	0.03	0.00
8001-8500	1.00	0.99	0.98	0.98	0.98	0.95	0.91	0.85	0.79	0.70	0.64	0.51	0.40	0.28	0.17	0.05	0.01	0.00
8501-9000	1.00	0.99	0.99	0.99	0.97	0.94	0.87	0.80	0.76	0.70	0.62	0.48	0.39	0.30	0.14	0.04	0.00	0.00
> 9000	1.00	1.00	1.00	1.00	0.92	0.85	0.77	0.77	0.69	0.69	0.62	0.54	0.38	0.31	0.08	0.00	0.00	0.00

Total Active System Storage (July 31^{st}, Year(I))	TOTAL ACTIVE SYSTEM STORAGE (thousands of Gl.) at the end of May in year(I+5)																	
	> 0	> 1.0	> 1.5	> 2.0	> 2.5	> 3.0	> 3.5	> 4.0	> 4.5	> 5.0	> 5.5	> 6.0	> 6.5	> 7.0	> 7.5	> 8.0	> 8.5	> 9.0
Gl.	probability of occurrance																	
< 1000	1.00	1.00	1.00	1.00	0.85	0.85	0.85	0.85	0.69	0.46	0.38	0.31	0.23	0.23	0.00	0.00	0.00	0.00
1001-1500	1.00	0.93	0.93	0.93	0.89	0.85	0.85	0.74	0.67	0.63	0.56	0.48	0.41	0.15	0.00	0.00	0.00	0.00
1501-2000	1.00	0.90	0.90	0.90	0.87	0.87	0.83	0.73	0.70	0.50	0.33	0.23	0.17	0.03	0.03	0.03	0.00	0.00
2001-2500	1.00	0.92	0.92	0.81	0.77	0.73	0.65	0.65	0.62	0.58	0.54	0.35	0.31	0.23	0.08	0.08	0.04	0.00
2501-3000	1.00	0.91	0.87	0.85	0.79	0.77	0.74	0.66	0.53	0.51	0.47	0.40	0.34	0.19	0.11	0.06	0.02	0.00
3001-3500	1.00	1.00	1.00	1.00	0.94	0.88	0.83	0.79	0.75	0.62	0.52	0.46	0.35	0.19	0.08	0.02	0.00	0.00
3501-4000	1.00	0.93	0.90	0.88	0.86	0.83	0.75	0.67	0.60	0.52	0.48	0.36	0.21	0.14	0.08	0.05	0.01	0.00
4001-4500	1.00	0.96	0.95	0.91	0.90	0.84	0.76	0.75	0.69	0.59	0.47	0.43	0.32	0.20	0.12	0.05	0.02	0.00
4501-5000	1.00	0.98	0.95	0.91	0.90	0.85	0.81	0.73	0.65	0.60	0.50	0.38	0.25	0.19	0.11	0.05	0.03	0.01
5001-5500	1.00	0.98	0.97	0.96	0.92	0.88	0.86	0.83	0.71	0.62	0.54	0.44	0.34	0.19	0.13	0.03	0.02	0.01
5501-6000	1.00	0.97	0.96	0.94	0.92	0.85	0.79	0.74	0.69	0.63	0.54	0.44	0.33	0.18	0.09	0.04	0.01	0.00
6001-6500	1.00	0.98	0.95	0.92	0.90	0.86	0.78	0.73	0.65	0.58	0.47	0.37	0.29	0.18	0.11	0.04	0.01	0.00
6501-7000	1.00	0.96	0.95	0.93	0.90	0.86	0.82	0.77	0.72	0.64	0.55	0.47	0.34	0.23	0.09	0.05	0.03	0.02
7001-7500	1.00	1.00	0.98	0.96	0.93	0.89	0.84	0.81	0.76	0.65	0.62	0.50	0.35	0.25	0.13	0.03	0.01	0.00
7501-8000	1.00	0.97	0.97	0.95	0.93	0.90	0.88	0.81	0.74	0.65	0.56	0.43	0.32	0.23	0.14	0.05	0.02	0.00
8001-8500	1.00	1.00	0.98	0.97	0.95	0.92	0.87	0.79	0.75	0.67	0.58	0.47	0.39	0.27	0.14	0.05	0.02	0.00
8501-9000	1.00	0.99	0.99	0.99	0.97	0.90	0.87	0.79	0.72	0.63	0.59	0.48	0.42	0.21	0.17	0.04	0.03	0.00
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.77	0.77	0.69	0.62	0.46	0.46	0.31	0.15	0.15	0.00	0.00

Total Active System Storage (July 31st, Year(I)	NEW SOUTH WALES ACTUAL SUPPLY on REQUIRED SUPPLY (as a percentage) July 31st to May 31st in year(I+1)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	0.62	0.38	0.15	0.08	0.08	0.00	0.00	0.00	0.00	0.00
1001-1500	1.00	0.67	0.63	0.48	0.41	0.26	0.15	0.00	0.00	0.00	0.00
1501-2000	1.00	0.77	0.67	0.57	0.53	0.40	0.30	0.20	0.13	0.03	0.03
2001-2500	1.00	0.62	0.42	0.35	0.31	0.27	0.12	0.08	0.04	0.04	0.00
2501-3000	1.00	0.81	0.62	0.53	0.40	0.32	0.23	0.19	0.11	0.06	0.02
3001-3500	1.00	0.81	0.71	0.62	0.56	0.50	0.44	0.31	0.25	0.10	0.00
3501-4000	1.00	0.87	0.82	0.71	0.62	0.58	0.53	0.43	0.35	0.22	0.01
4001-4500	1.00	0.95	0.92	0.87	0.81	0.73	0.66	0.58	0.47	0.30	0.07
4501-5000	1.00	0.94	0.89	0.84	0.78	0.73	0.70	0.63	0.49	0.38	0.05
5001-5500	1.00	0.96	0.94	0.91	0.87	0.80	0.75	0.69	0.63	0.51	0.12
5501-6000	1.00	0.97	0.96	0.94	0.91	0.90	0.87	0.83	0.78	0.66	0.18
6001-6500	1.00	0.99	0.98	0.97	0.96	0.94	0.91	0.88	0.81	0.75	0.25
6501-7000	1.00	0.99	0.99	0.99	0.98	0.97	0.96	0.95	0.94	0.87	0.39
7001-7500	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.96	0.94	0.52
7501-8000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.85
8001-8500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93
8501-9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Total Active System Storage (July 31st, Year(I)	NEW SOUTH WALES **ACTUAL SUPPLY on REQUIRED SUPPLY (as a percentage)** July 31st to May 31st in year(I+2)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	0.85	0.69	0.62	0.46	0.38	0.38	0.38	0.38	0.15	0.00
1001-1500	1.00	0.89	0.78	0.74	0.63	0.56	0.52	0.48	0.41	0.30	0.00
1501-2000	1.00	0.93	0.80	0.73	0.63	0.50	0.37	0.37	0.37	0.20	0.07
2001-2500	1.00	0.88	0.77	0.65	0.62	0.58	0.46	0.42	0.31	0.31	0.04
2501-3000	1.00	0.85	0.83	0.70	0.62	0.55	0.47	0.40	0.38	0.34	0.04
3001-3500	1.00	0.83	0.79	0.73	0.67	0.63	0.58	0.48	0.40	0.29	0.10
3501-4000	1.00	0.90	0.86	0.82	0.80	0.77	0.75	0.65	0.57	0.48	0.15
4001-4500	1.00	0.91	0.88	0.85	0.82	0.76	0.74	0.70	0.66	0.56	0.19
4501-5000	1.00	0.93	0.85	0.81	0.79	0.74	0.70	0.65	0.60	0.52	0.22
5001-5500	1.00	0.93	0.92	0.88	0.86	0.83	0.74	0.70	0.60	0.55	0.21
5501-6000	1.00	0.97	0.97	0.92	0.89	0.86	0.84	0.78	0.72	0.63	0.34
6001-6500	1.00	0.95	0.93	0.91	0.88	0.87	0.84	0.79	0.75	0.70	0.39
6501-7000	1.00	0.96	0.94	0.93	0.91	0.88	0.85	0.82	0.79	0.74	0.44
7001-7500	1.00	0.97	0.96	0.95	0.92	0.91	0.90	0.88	0.85	0.78	0.49
7501-8000	1.00	1.00	0.98	0.98	0.97	0.96	0.96	0.95	0.93	0.88	0.67
8001-8500	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.96	0.93	0.64
8501-9000	1.00	1.00	1.00	1.00	0.99	0.97	0.97	0.97	0.96	0.92	0.69
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92

Total Active System Storage (July 31st, Year(I)	NEW SOUTH WALES ACTUAL SUPPLY on REQUIRED SUPPLY (as a percentage) July 31st to May 31st in year(I+3)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	1.00	0.85	0.77	0.69	0.46	0.31	0.31	0.31	0.31	0.08
1001-1500	1.00	0.96	0.96	0.81	0.74	0.74	0.67	0.59	0.59	0.52	0.19
1501-2000	1.00	0.90	0.90	0.80	0.77	0.67	0.60	0.57	0.53	0.40	0.13
2001-2500	1.00	0.88	0.77	0.73	0.73	0.69	0.62	0.62	0.58	0.35	0.12
2501-3000	1.00	0.89	0.83	0.77	0.68	0.66	0.66	0.60	0.49	0.43	0.09
3001-3500	1.00	0.88	0.85	0.77	0.71	0.69	0.65	0.58	0.50	0.44	0.13
3501-4000	1.00	0.95	0.92	0.91	0.85	0.79	0.77	0.76	0.71	0.53	0.26
4001-4500	1.00	0.92	0.88	0.82	0.79	0.77	0.72	0.67	0.65	0.62	0.31
4501-5000	1.00	0.94	0.89	0.85	0.84	0.79	0.77	0.71	0.67	0.60	0.29
5001-5500	1.00	0.94	0.92	0.90	0.87	0.86	0.78	0.74	0.64	0.58	0.23
5501-6000	1.00	0.98	0.96	0.94	0.92	0.89	0.87	0.82	0.78	0.72	0.38
6001-6500	1.00	0.93	0.91	0.90	0.89	0.85	0.82	0.78	0.74	0.67	0.45
6501-7000	1.00	0.95	0.93	0.92	0.91	0.87	0.86	0.84	0.80	0.71	0.40
7001-7500	1.00	0.99	0.97	0.93	0.89	0.88	0.85	0.81	0.78	0.73	0.48
7501-8000	1.00	0.97	0.95	0.93	0.92	0.90	0.89	0.85	0.83	0.80	0.51
8001-8500	1.00	0.96	0.95	0.94	0.93	0.93	0.92	0.89	0.85	0.81	0.57
8501-9000	1.00	0.99	0.99	0.97	0.97	0.94	0.94	0.94	0.90	0.86	0.62
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.54

Total Active System Storage (July 31^{st}, Year(I)	**NEW SOUTH WALES** **ACTUAL SUPPLY on REQUIRED SUPPLY** (as a percentage) July 31^{st} to May 31^{st} in year(I+4)										
	$> 50\%$	$> 55\%$	$> 60\%$	$> 65\%$	$> 70\%$	$> 75\%$	$> 80\%$	$> 85\%$	$> 90\%$	$> 95\%$	$= 100\%$
Gl.	probability of occurrance										
< 1000	1.00	0.85	0.77	0.69	0.62	0.62	0.54	0.46	0.46	0.46	0.31
1001-1500	1.00	0.96	0.96	0.93	0.89	0.81	0.81	0.81	0.81	0.78	0.26
1501-2000	1.00	0.90	0.83	0.80	0.77	0.73	0.67	0.63	0.60	0.53	0.17
2001-2500	1.00	0.88	0.88	0.88	0.81	0.77	0.69	0.65	0.62	0.42	0.27
2501-3000	1.00	0.91	0.81	0.79	0.74	0.72	0.68	0.66	0.64	0.47	0.19
3001-3500	1.00	0.92	0.90	0.85	0.83	0.81	0.77	0.75	0.67	0.58	0.15
3501-4000	1.00	0.95	0.92	0.87	0.84	0.82	0.74	0.68	0.64	0.52	0.32
4001-4500	1.00	0.96	0.92	0.87	0.79	0.77	0.75	0.73	0.68	0.64	0.38
4501-5000	1.00	0.96	0.93	0.90	0.87	0.81	0.79	0.76	0.71	0.65	0.38
5001-5500	1.00	0.92	0.88	0.84	0.81	0.77	0.74	0.71	0.67	0.64	0.39
5501-6000	1.00	0.96	0.93	0.90	0.89	0.86	0.85	0.84	0.77	0.68	0.37
6001-6500	1.00	0.96	0.95	0.95	0.93	0.89	0.84	0.79	0.75	0.69	0.44
6501-7000	1.00	0.95	0.90	0.89	0.88	0.87	0.86	0.81	0.77	0.74	0.44
7001-7500	1.00	0.96	0.96	0.94	0.92	0.88	0.85	0.81	0.77	0.70	0.38
7501-8000	1.00	0.95	0.92	0.90	0.88	0.86	0.85	0.81	0.77	0.71	0.42
8001-8500	1.00	0.98	0.98	0.96	0.94	0.93	0.90	0.86	0.84	0.78	0.52
8501-9000	1.00	0.99	0.94	0.90	0.90	0.89	0.87	0.86	0.83	0.79	0.48
> 9000	1.00	0.92	0.92	0.92	0.92	0.77	0.77	0.77	0.69	0.69	0.46

Total Active System Storage (July 31st, Year(I)	NEW SOUTH WALES ACTUAL SUPPLY on REQUIRED SUPPLY (as a percentage) July 31st to May 31st in year(I+5)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	1.00	1.00	1.00	1.00	0.92	0.77	0.77	0.77	0.77	0.38
1001-1500	1.00	0.89	0.89	0.89	0.85	0.85	0.81	0.81	0.81	0.81	0.44
1501-2000	1.00	0.97	0.97	0.90	0.83	0.83	0.77	0.70	0.63	0.63	0.27
2001-2500	1.00	0.88	0.85	0.85	0.77	0.73	0.73	0.69	0.69	0.62	0.27
2501-3000	1.00	0.96	0.89	0.83	0.83	0.77	0.74	0.70	0.64	0.55	0.23
3001-3500	1.00	0.94	0.94	0.94	0.94	0.92	0.87	0.83	0.79	0.62	0.27
3501-4000	1.00	0.92	0.85	0.80	0.78	0.77	0.76	0.72	0.70	0.62	0.30
4001-4500	1.00	0.91	0.91	0.85	0.81	0.78	0.74	0.73	0.71	0.59	0.37
4501-5000	1.00	0.97	0.94	0.89	0.84	0.81	0.77	0.70	0.68	0.63	0.36
5001-5500	1.00	0.97	0.95	0.94	0.89	0.86	0.86	0.81	0.74	0.66	0.44
5501-6000	1.00	0.94	0.92	0.91	0.87	0.82	0.79	0.76	0.72	0.66	0.40
6001-6500	1.00	0.93	0.89	0.86	0.83	0.80	0.76	0.73	0.70	0.66	0.38
6501-7000	1.00	0.94	0.91	0.90	0.88	0.85	0.84	0.80	0.78	0.71	0.46
7001-7500	1.00	0.98	0.95	0.92	0.90	0.87	0.86	0.83	0.78	0.74	0.40
7501-8000	1.00	0.96	0.95	0.93	0.92	0.90	0.88	0.84	0.74	0.66	0.39
8001-8500	1.00	0.97	0.96	0.94	0.93	0.90	0.86	0.84	0.80	0.75	0.45
8501-9000	1.00	0.97	0.96	0.93	0.92	0.92	0.90	0.86	0.86	0.80	0.45
> 9000	1.00	1.00	0.92	0.85	0.85	0.85	0.85	0.85	0.77	0.69	0.46

Total Active System Storage (July 31^{st}, Year(I))	VICTORIA **ACTUAL SUPPLY on REQUIRED SUPPLY (as a percentage)** July 31^{st} to May 31^{st} in year(I+1)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	0.77	0.69	0.62	0.38	0.31	0.23	0.08	0.00	0.00	0.00
1001-1500	1.00	0.81	0.81	0.78	0.74	0.67	0.52	0.37	0.26	0.11	0.00
1501-2000	1.00	0.93	0.90	0.90	0.90	0.77	0.60	0.50	0.43	0.27	0.00
2001-2500	1.00	0.96	0.92	0.92	0.85	0.81	0.73	0.62	0.46	0.27	0.00
2501-3000	1.00	1.00	1.00	0.98	0.96	0.94	0.85	0.68	0.53	0.38	0.00
3001-3500	1.00	1.00	1.00	1.00	0.98	0.98	0.96	0.92	0.71	0.62	0.08
3501-4000	1.00	1.00	1.00	1.00	0.99	0.98	0.97	0.96	0.86	0.78	0.33
4001-4500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.91	0.62
4501-5000	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.97	0.77
5001-5500	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.96	0.74
5501-6000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.98	0.77
6001-6500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.82
6501-7000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.88
7001-7500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93
7501-8000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98
8001-8500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8501-9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Total Active System Storage (July 31^{st}, Year(I)	VICTORIA **ACTUAL SUPPLY on REQUIRED SUPPLY (as a percentage)** July 31^{st} to May 31^{st} in year(I+2)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	0.85	0.85	0.77	0.77	0.77	0.54	0.54	0.38	0.38	0.00
1001-1500	1.00	1.00	0.93	0.93	0.89	0.85	0.74	0.59	0.52	0.44	0.07
1501-2000	1.00	0.97	0.93	0.87	0.87	0.83	0.77	0.67	0.60	0.47	0.17
2001-2500	1.00	0.92	0.92	0.92	0.92	0.92	0.85	0.73	0.65	0.50	0.15
2501-3000	1.00	0.96	0.96	0.96	0.94	0.87	0.81	0.77	0.68	0.57	0.23
3001-3500	1.00	0.96	0.96	0.96	0.90	0.87	0.87	0.83	0.71	0.69	0.27
3501-4000	1.00	0.98	0.98	0.98	0.96	0.96	0.93	0.91	0.86	0.76	0.50
4001-4500	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.96	0.91	0.87	0.71
4501-5000	1.00	1.00	1.00	1.00	0.99	0.98	0.98	0.96	0.94	0.92	0.74
5001-5500	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.97	0.96	0.94	0.77
5501-6000	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.97	0.96	0.80
6001-6500	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.95	0.83
6501-7000	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.95	0.81
7001-7500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.89
7501-8000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.98	0.90
8001-8500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92
8501-9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.87
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Total Active System Storage (July 31st, Year(I)	VICTORIA **ACTUAL SUPPLY on REQUIRED SUPPLY (as a percentage)** July 31st to May 31st in year(I+3)									
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	1.00	0.92	0.92	0.92	0.92	0.85	0.77	0.62	0.31	0.31
1001-1500	1.00	1.00	1.00	1.00	1.00	0.96	0.89	0.81	0.70	0.70	0.33
1501-2000	1.00	1.00	1.00	1.00	1.00	0.97	0.93	0.90	0.77	0.73	0.23
2001-2500	1.00	0.96	0.92	0.92	0.92	0.88	0.85	0.85	0.81	0.69	0.27
2501-3000	1.00	0.98	0.98	0.96	0.94	0.94	0.87	0.81	0.77	0.68	0.36
3001-3500	1.00	0.94	0.92	0.90	0.90	0.88	0.85	0.79	0.75	0.69	0.52
3501-4000	1.00	0.98	0.98	0.97	0.95	0.95	0.93	0.89	0.88	0.82	0.60
4001-4500	1.00	0.99	0.99	0.99	0.99	0.98	0.96	0.93	0.91	0.88	0.71
4501-5000	1.00	1.00	1.00	1.00	0.98	0.98	0.98	0.97	0.93	0.92	0.73
5001-5500	1.00	0.99	0.99	0.99	0.99	0.98	0.97	0.97	0.93	0.92	0.78
5501-6000	1.00	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.97	0.96	0.84
6001-6500	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.95	0.94	0.79
6501-7000	1.00	1.00	1.00	1.00	0.98	0.98	0.98	0.96	0.94	0.91	0.79
7001-7500	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.97	0.96	0.82
7501-8000	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.97	0.95	0.84
8001-8500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.98	0.86
8501-9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.90
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85

Total Active System Storage (July 31st, Year(I)	VICTORIA ACTUAL SUPPLY on REQUIRED SUPPLY (as a percentage) July 31st to May 31st in year(I+4)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.85	0.69	0.54	0.23
1001-1500	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.93	0.93	0.81	0.52
1501-2000	1.00	1.00	0.97	0.97	0.97	0.97	0.90	0.90	0.87	0.80	0.53
2001-2500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.81	0.73	0.50
2501-3000	1.00	0.96	0.96	0.94	0.91	0.91	0.91	0.85	0.83	0.81	0.49
3001-3500	1.00	0.96	0.96	0.96	0.94	0.94	0.92	0.90	0.85	0.79	0.52
3501-4000	1.00	1.00	1.00	1.00	0.99	0.97	0.97	0.95	0.88	0.85	0.64
4001-4500	1.00	1.00	0.99	0.99	0.99	0.97	0.96	0.93	0.90	0.89	0.69
4501-5000	1.00	1.00	1.00	0.99	0.98	0.98	0.96	0.95	0.92	0.88	0.72
5001-5500	1.00	0.98	0.98	0.97	0.97	0.97	0.94	0.92	0.91	0.88	0.77
5501-6000	1.00	0.98	0.98	0.98	0.97	0.97	0.96	0.96	0.94	0.94	0.82
6001-6500	1.00	0.99	0.99	0.99	0.99	0.99	0.98	0.97	0.96	0.93	0.79
6501-7000	1.00	0.99	0.99	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.79
7001-7500	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.96	0.94	0.80
7501-8000	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.96	0.94	0.81
8001-8500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.97	0.95	0.82
8501-9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.97	0.86
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.92

Total Active System Storage (July 31st, Year(I)	**VICTORIA** **ACTUAL SUPPLY on REQUIRED SUPPLY** (as a percentage) July 31st to May 31st in year(I+5)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.77	0.38
1001-1500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93	0.89	0.85	0.78
1501-2000	1.00	0.97	0.97	0.97	0.97	0.97	0.90	0.87	0.83	0.83	0.67
2001-2500	1.00	0.96	0.96	0.96	0.96	0.96	0.96	0.88	0.81	0.77	0.54
2501-3000	1.00	0.98	0.98	0.98	0.94	0.94	0.91	0.91	0.85	0.81	0.53
3001-3500	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.94	0.88	0.67
3501-4000	1.00	1.00	0.99	0.97	0.96	0.95	0.93	0.91	0.89	0.87	0.65
4001-4500	1.00	0.99	0.99	0.99	0.98	0.97	0.94	0.92	0.88	0.86	0.69
4501-5000	1.00	0.99	0.99	0.99	0.98	0.97	0.95	0.92	0.90	0.88	0.73
5001-5500	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.97	0.95	0.92	0.75
5501-6000	1.00	0.99	0.98	0.98	0.98	0.97	0.96	0.95	0.92	0.89	0.75
6001-6500	1.00	0.99	0.99	0.99	0.98	0.98	0.96	0.95	0.93	0.90	0.74
6501-7000	1.00	0.99	0.99	0.99	0.99	0.97	0.97	0.96	0.94	0.92	0.80
7001-7500	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.97	0.94	0.78
7501-8000	1.00	0.99	0.99	0.99	0.99	0.98	0.97	0.97	0.96	0.95	0.81
8001-8500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.95	0.84
8501-9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.96	0.94	0.80
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.77

Total Active System Storage (July 31^{st}, Year(I)	SOUTH AUSTRALIA ACTUAL SUPPLY on REQUIRED SUPPLY (as a percentage) July 31^{st} to May 31^{st} in year(I+1)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	1.00	1.00	1.00	0.92	0.92	0.92	0.92	0.77	0.69	0.08
1001-1500	1.00	1.00	1.00	1.00	0.96	0.93	0.89	0.89	0.85	0.85	0.22
1501-2000	1.00	1.00	1.00	1.00	0.97	0.97	0.90	0.87	0.83	0.83	0.37
2001-2500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.81	0.73	0.15
2501-3000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.94	0.89	0.21
3001-3500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.38
3501-4000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.48
4001-4500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.60
4501-5000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.69
5001-5500	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.70
5501-6000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.78
6001-6500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.81
6501-7000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.89
7001-7500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96
7501-8000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
8001-8500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8501-9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Total Active System Storage (July 31^{st}, Year(I)	SOUTH AUSTRALIA ACTUAL SUPPLY on REQUIRED SUPPLY (as a percentage) July 31^{st} to May 31^{st} in year(I+2)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	1.00	1.00	1.00	0.92	0.92	0.92	0.92	0.92	0.85	0.31
1001-1500	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.93	0.89	0.48
1501-2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.90	0.90	0.43
2001-2500	1.00	1.00	1.00	1.00	0.96	0.96	0.96	0.96	0.92	0.88	0.38
2501-3000	1.00	1.00	1.00	1.00	0.98	0.96	0.96	0.96	0.94	0.94	0.45
3001-3500	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.94	0.94	0.92	0.52
3501-4000	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.68
4001-4500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.74
4501-5000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.70
5001-5500	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.97	0.76
5501-6000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.79
6001-6500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80
6501-7000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.81
7001-7500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88
7501-8000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92
8001-8500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91
8501-9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Total Active System Storage (July 31^{st}, Year(I)	SOUTH AUSTRALIA ACTUAL SUPPLY on REQUIRED SUPPLY (as a percentage) July 31^{st} to May 31^{st} in year(I+3)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.85	0.38
1001-1500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.59
1501-2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.47
2001-2500	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.96	0.96	0.54
2501-3000	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.98	0.96	0.94	0.55
3001-3500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.58
3501-4000	1.00	1.00	1.00	1.00	0.99	0.98	0.98	0.97	0.96	0.93	0.71
4001-4500	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.98	0.72
4501-5000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.77
5001-5500	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.98	0.75
5501-6000	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.85
6001-6500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.81
6501-7000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.84
7001-7500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.84
7501-8000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.80
8001-8500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.86
8501-9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92

Total Active System Storage (July 31^{st}, Year(I)	SOUTH AUSTRALIA **ACTUAL SUPPLY on REQUIRED SUPPLY** (as a percentage) July 31^{st} to May 31^{st} in year(I+4)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.46
1001-1500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.74
1501-2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.63
2001-2500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.73
2501-3000	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.96	0.96	0.91	0.62
3001-3500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.96	0.96	0.69
3501-4000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.65
4001-4500	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.73
4501-5000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.74
5001-5500	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.98	0.79
5501-6000	1.00	1.00	1.00	1.00	1.00	0.99	0.98	0.98	0.97	0.97	0.82
6001-6500	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.98	0.82
6501-7000	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.98	0.81
7001-7500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.79
7501-8000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.79
8001-8500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88
8501-9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85

Total Active System Storage (July 31st, Year(I)	SOUTH AUSTRALIA ACTUAL SUPPLY on REQUIRED SUPPLY (as a percentage) July 31st to May 31st in year(I+5)										
	> 50%	> 55%	> 60%	> 65%	> 70%	> 75%	> 80%	> 85%	> 90%	> 95%	= 100%
Gl.	probability of occurrance										
< 1000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.77
1001-1500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.74
1501-2000	1.00	1.00	1.00	1.00	1.00	0.97	0.97	0.97	0.97	0.97	0.77
2001-2500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.62
2501-3000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.94	0.68
3001-3500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.83
3501-4000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.96	0.95	0.73
4001-4500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.97	0.72
4501-5000	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.98	0.98	0.75
5001-5500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80
5501-6000	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.97	0.96	0.79
6001-6500	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.98	0.98	0.98	0.71
6501-7000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.82
7001-7500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.82
7501-8000	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.98	0.83
8001-8500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.82
8501-9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.86
> 9000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.77

Appendix L

Significance Testing – Fully Developed Model Data

In this Appendix the abreviations used are defined below.

Abreviation	Full Title
Mean	Mean of the data.
St.Dev	Standard deviation of the data.
Cs.	Coefficient of skewness.
Ck.	Coefficient of kurtosis.
SC1	Lag 1 serial correlation coefficient.

STATISTICAL TESTING AGAINST HISTORICAL DATA
Net Snowy diversion to Hume.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed 0.545	Passed 0.144	Passed 0.073	Passed -0.013	Passed -0.145	Passed 0.074	Passed -0.025	Passed -0.119	Passed -0.066	Passed 0.017	Passed 0.114	Passed 0.342	Passed 0.113
Sdev.	Failed 3.200	Passed 1.362	Passed -0.069	Passed 0.290	Passed -0.281	Passed -1.125	Passed -0.025	Passed 0.161	Passed 0.186	Passed -0.367	Passed -0.243	Passed 0.932	Passed -0.214
Cs.	Failed -2.551	Failed -2.813	Passed -1.671	Passed 1.035	Failed 2.355	Passed 1.492	Passed -0.068	Passed -0.898	Passed -0.612	Passed -0.385	Passed 0.399	Failed -5.823	Passed -1.383
Ck.	Failed -8.794	Failed -8.938	Failed -3.576	Failed -7.907	Failed -3.575	Passed -1.617	Passed 0.559	Failed 2.430	Passed -1.056	Passed 0.832	Failed -2.070	Failed < -9.9	Passed 0.362
SC1	Passed -1.032	Passed 0.762	Passed -0.571	Passed 0.022	Passed -0.131	Passed 0.074	Passed 0.555	Passed 0.504	Passed 0.540	Passed -0.746	Passed -0.508	Passed -0.438	Passed 0.298

STATISTICAL TESTING AGAINST HISTORICAL DATA
Inflow to Murray Gates.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed -0.004	Passed -0.064	Passed -0.239	Passed -0.131	Passed 0.202	Passed -0.005	Passed -0.097	Passed -0.044	Passed 0.224	Passed 0.076	Passed 0.064	Passed 0.076	Passed 0.045
Sdev.	Passed -0.098	Passed -0.623	Passed -1.479	Failed -2.818	Passed -0.095	Passed -0.904	Passed -0.490	Passed -0.298	Passed -0.040	Passed -0.807	Passed 0.059	Passed -0.335	Passed -1.583
Cs.	Passed -0.954	Passed -0.434	Passed -1.291	Failed < -9.9	Passed -1.873	Passed -1.804	Passed 0.223	Passed -1.226	Passed -1.090	Failed -3.579	Passed -0.464	Failed -2.129	Passed -1.940
Ck.	Failed -2.469	Passed 0.170	Passed -1.893	Failed > 9.99	Failed -5.951	Failed -3.191	Passed 0.912	Passed -0.701	Passed -0.371	Failed -7.314	Passed -0.222	Failed -5.379	Failed -2.667
SC1	Passed 0.874	Passed -0.317	Passed 0.007	Passed 0.181	Passed -1.617	Passed -0.190	Passed 0.108	Passed 0.216	Passed 0.172	Passed -0.410	Passed -0.001	Passed 0.080	Passed -0.517

STATISTICAL TESTING AGAINST HISTORICAL DATA
Inflows to Dartmouth.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed -0.084	Passed 0.094	Passed -0.096	Passed -0.088	Passed 0.210	Passed -0.003	Passed 0.026	Passed -0.040	Passed 0.324	Passed 0.064	Passed -0.045	Passed -0.036	Passed 0.062
Sdev.	Passed -0.413	Passed -0.478	Passed -1.010	Failed -2.496	Passed -0.229	Passed -0.927	Passed -0.141	Passed -0.410	Passed 0.127	Passed -1.118	Passed -1.780	Passed -0.458	Passed -1.365
Cs.	Passed 0.116	Passed -0.387	Failed -2.033	Failed < -9.9	Passed -1.945	Passed -1.691	Passed 0.201	Passed -0.245	Passed -1.325	Failed -4.838	Passed -0.912	Passed -0.877	Passed -1.692
Ck.	Passed 0.786	Passed 0.280	Failed -6.988	Failed < -9.9	Failed -6.335	Failed -3.166	Passed 0.925	Passed -0.450	Failed -4.463	Failed < -9.9	Passed -0.675	Passed -1.450	Failed -4.229
SC1	Passed 0.745	Passed -0.050	Passed 0.561	Passed 1.932	Passed -1.476	Passed -0.043	Passed 0.221	Passed 1.039	Passed 0.824	Passed -0.679	Passed 0.669	Passed 0.444	Passed -0.360

STATISTICAL TESTING AGAINST HISTORICAL DATA
Inflow to Hume.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed -0.042	Passed -0.010	Passed -0.176	Passed -0.065	Passed 0.237	Passed 0.072	Passed -0.005	Passed -0.057	Passed 0.292	Passed 0.036	Passed -0.064	Passed -0.052	Passed 0.051
Sdev.	Passed -0.408	Passed -0.511	Passed -1.191	Failed -0.597	Passed -0.031	Passed -0.731	Passed -0.349	Passed -0.402	Passed 0.122	Passed -0.672	Passed -0.567	Passed -0.450	Passed -1.413
Cs.	Failed -2.191	Passed -0.195	Passed -1.205	Failed > 9.99	Failed -2.204	Passed -1.743	Passed 0.041	Passed -1.066	Passed -0.466	Passed -1.790	Passed -0.346	Passed -1.087	Passed -1.449
Ck.	Failed -8.777	Passed 0.743	Failed -2.479	Failed < -9.9	Failed -8.399	Failed -3.901	Passed 0.442	Passed -0.507	Passed -0.914	Failed -4.984	Passed 0.397	Failed -2.361	Failed -2.484
SC1	Passed 1.329	Passed -0.186	Passed 0.445	Passed 0.646	Failed -2.297	Passed -0.117	Passed 0.220	Passed 0.067	Passed -0.312	Passed -0.573	Passed 0.233	Passed -0.023	Passed -0.559

STATISTICAL TESTING AGAINST HISTORICAL DATA
Inflow from Kiewa River.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed 0.005	Passed -0.027	Passed -0.020	Passed -0.174	Passed -0.035	Passed 0.211	Passed 0.182	Passed -0.043	Passed -0.263	Passed -0.015	Passed -0.125	Passed 0.038	Passed 0.061
Sdev.	Passed -0.463	Passed -1.152	Passed -0.699	Failed -2.706	Passed -1.598	Passed -0.238	Passed 0.064	Passed -0.476	Passed 0.129	Passed -0.545	Passed -0.833	Passed -0.205	Passed -1.750
Cs.	Passed -0.463	Passed -1.152	Failed -1.986	Failed < -9.9	Failed -4.645	Passed -1.606	Passed -0.823	Passed -1.451	Passed -0.554	Passed -0.783	Passed -0.370	Passed -0.541	Failed -2.286
Ck.	Failed -2.200	Passed -1.813	Failed -2.560	Failed < -9.9	Failed < -9.9	Failed -3.665	Passed -1.516	Passed -1.143	Passed -1.171	Passed -1.877	Passed 0.158	Passed -0.322	Failed -4.574
SC1	Passed 0.581	Passed -0.012	Passed -0.761	Passed 1.445	Failed -2.691	Passed 0.212	Passed -0.172	Passed -0.214	Passed 0.011	Passed -0.538	Passed 0.100	Passed 0.141	Passed -0.861

STATISTICAL TESTING AGAINST HISTORICAL DATA
Unregulated inflows to Hume.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed -0.042	Passed -0.061	Passed -0.177	Passed -0.059	Passed 0.276	Passed 0.099	Passed 0.037	Passed -0.016	Passed 0.259	Passed 0.029	Passed -0.075	Passed -0.031	Passed 0.066
Sdev.	Passed -0.701	Passed -0.539	Passed -1.178	Failed -2.804	Passed -0.069	Passed -0.691	Passed -0.055	Passed -0.317	Passed -0.020	Passed -0.791	Passed -0.699	Passed -0.511	Passed -1.395
Cs.	Failed -3.960	Passed -0.092	Passed -1.447	Failed < -9.9	Failed -2.911	Failed -2.034	Passed 0.252	Passed -1.689	Passed -0.624	Passed -1.736	Passed -0.568	Passed -1.358	Passed -1.420
Ck.	Failed > 9.99	Passed 0.992	Failed -3.386	Failed < -9.9	Failed < -9.9	Failed -5.202	Passed 0.533	Passed -1.063	Passed -0.947	Failed -4.138	Passed 0.118	Failed -3.247	Failed -2.224
SC1	Passed 1.378	Passed -0.126	Passed 0.375	Passed 0.141	Failed -2.861	Passed -0.179	Passed 0.053	Passed -0.387	Passed -0.285	Passed -0.376	Passed 0.311	Passed -0.089	Passed -0.784

STATISTICAL TESTING AGAINST HISTORICAL DATA
Inflow from the Ovens River.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed -0.050	Passed 0.437	Passed 0.150	Passed -0.159	Passed 0.032	Passed 0.218	Passed 0.131	Passed -0.037	Passed 0.210	Passed 0.039	Passed 0.034	Passed -0.176	Passed 0.093
Sdev.	Passed -0.374	Passed 0.091	Passed -0.374	Passed 0.293	Passed 0.071	Passed 0.640	Passed -0.102	Passed -0.446	Passed -0.078	Passed -0.657	Passed -0.573	Passed -1.234	Passed -1.088
Cs.	Passed -0.100	Failed -5.101	Failed -2.401	Failed -5.917	Passed 0.481	Passed -0.819	Passed -1.753	Passed -0.115	Passed -1.422	Passed -0.611	Passed -0.489	Passed -1.004	Passed -1.243
Ck.	Passed -0.001	Failed < -9.9	Failed -7.653	Failed < -9.9	Failed 3.634	Passed 0.736	Passed -1.674	Failed -2.083	Passed -0.248	Passed -0.916	Passed -0.151	Passed 0.791	Passed -1.247
SC1	Passed 0.717	Passed 1.597	Passed -0.545	Failed 2.266	Passed -1.498	Passed -0.009	Passed 0.456	Passed -0.153	Passed -0.181	Passed -0.961	Passed -0.279	Passed 0.696	Passed -1.307

STATISTICAL TESTING AGAINST HISTORICAL DATA
Inflow from the Murrumbidgee River.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed -0.329	Passed 0.135	Passed -0.500	Passed -0.456	Failed 2.663	Failed 3.985	Failed 2.821	Passed -0.156	Passed 0.378	Passed -0.135	Passed -0.655	Passed -0.057	Passed 1.526
Sdev.	Failed -5.278	Passed 0.050	Failed -6.156	Passed -0.336	Failed > 9.99	Failed > 9.99	Failed > 9.99	Failed 5.219	Failed 4.414	Passed 0.261	Passed -1.868	Passed -1.177	Passed 1.570
Cs.	Failed < −9.9	Failed -3.231	Failed < −9.9	Failed 4.734	Failed -8.317	Failed -6.508	Failed -3.672	Failed 2.412	Passed 1.932	Failed 2.408	Failed 2.291	Passed 0.436	Failed -3.202
Ck.	Failed < −9.9	Failed -5.984	Failed < −9.9	Failed > 9.99	Failed < −9.9	Failed < −9.9	Failed < −9.9	Failed 2.916	Passed 1.866	Failed 6.874	Failed 6.493	Failed 5.184	Failed > 9.99
SC1	Failed 2.394	Passed 0.422	Failed 3.166	Failed -4.884	Failed -5.113	Failed -4.757	Failed -3.059	Passed -0.939	Passed -1.053	Failed -2.528	Passed -0.272	Passed -1.217	Passed -0.255

STATISTICAL TESTING AGAINST HISTORICAL DATA
Inflow to Menindee Lakes.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed 1.298	Passed 0.966	Passed 0.788	Passed 0.031	Passed 1.780	Passed 1.844	Passed 1.471	Passed 1.147	Passed 1.093	Passed 0.469	Passed 1.239	Passed 1.712	Passed 1.551
Sdev.	Failed 5.196	Failed 4.174	Failed 2.047	Passed -1.835	Failed 7.046	Failed 6.883	Failed 5.591	Failed 3.877	Failed 3.029	Failed 2.109	Failed 6.585	Failed 8.756	Passed -0.156
Cs.	Failed -5.466	Failed -5.147	Failed -2.238	Failed -9.095	Failed -5.591	Failed -7.735	Failed -3.928	Failed -2.626	Passed -1.477	Passed -0.560	Passed -1.368	Passed -1.450	Failed -5.994
Ck.	Failed < -9.9	Failed < -9.9	Failed -9.194	Failed < -9.9	Failed < -9.9	Failed < -9.9	Failed < -9.9	Failed < -9.9	Failed -5.334	Failed -2.053	Failed -8.838	Failed < -9.9	Failed < -9.9
SC1	Failed -2.575	Passed 1.628	Failed -2.792	Failed -3.416	Failed -3.495	Failed -3.437	Failed -3.626	Failed -2.522	Passed -1.659	Failed -2.537	Passed -0.122	Passed -1.037	Passed -0.312

STATISTICAL TESTING AGAINST HISTORICAL DATA
Inflow fro the Goulburn, Broken and Campaspe Rivers.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed 0.165	Passed -0.202	Passed -0.079	Passed 0.234	Passed -0.173	Passed 0.811	Passed 0.417	Passed -0.186	Passed 0.006	Passed -0.646	Passed -0.548	Passed 0.425	Passed -0.035
Sdev.	Passed 0.140	Passed -1.807	Passed -1.217	Passed 1.273	Passed -1.594	Failed 4.355	Failed 2.200	Passed -0.089	Passed 1.406	Passed -0.036	Passed 0.464	Passed 1.058	Passed 0.462
Cs.	Passed -0.532	Failed -2.368	Passed -0.785	Passed -1.167	Failed -1.248	Passed -0.913	Passed -0.024	Passed 0.750	Passed 1.957	Failed 3.850	Failed 3.527	Passed -1.642	Passed -0.251
Ck.	Passed -1.125	Failed -3.120	Passed -0.125	Failed -5.556	Failed < -9.9	Failed -6.631	Passed -1.209	Passed 1.591	Failed 3.510	Failed > 9.99	Failed > 9.99	Failed -6.437	Failed -2.782
SC1	Passed 0.266	Failed -1.984	Passed -1.517	Failed -3.420	Failed -4.759	Failed -2.770	Passed -1.849	Passed -0.199	Passed -0.330	Passed -0.462	Passed 0.317	Passed -1.620	Failed -2.058

STATISTICAL TESTING AGAINST HISTORICAL DATA
Deniliquin rainfall.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed 0.603	Passed -0.127	Passed 0.118	Passed 0.148	Passed 0.083	Passed 0.238	Passed 0.087	Passed -0.027	Passed -0.029	Passed 0.229	Passed -0.016	Passed 0.110	Passed 0.346
Sdev.	Passed 1.585	Passed -0.213	Passed 0.655	Passed 0.653	Passed 0.119	Passed 0.612	Passed 0.065	Passed -0.166	Passed -0.299	Passed -0.154	Passed 0.053	Passed 0.193	Passed -0.582
Cs.	Failed -3.105	Passed 0.534	Passed 0.189	Passed 0.829	Passed 0.412	Passed -0.646	Passed -0.374	Passed -0.503	Passed -0.387	Passed -0.494	Passed -0.332	Passed -0.552	Passed -0.802
Ck.	Failed < -9.9	Passed 1.097	Passed -0.778	Passed 0.951	Passed 0.846	Passed -0.618	Passed -0.563	Passed -1.744	Passed -0.284	Passed -0.225	Passed -0.829	Passed -1.027	Passed -1.416
SC1	Passed 0.392	Passed 0.575	Passed -0.804	Passed -0.089	Passed -0.101	Passed -0.676	Passed 0.570	Passed 0.539	Passed -0.001	Passed -0.114	Passed 0.069	Passed -0.057	Passed -0.598

STATISTICAL TESTING AGAINST HISTORICAL DATA
Kerang Post Office rainfall.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed 0.518	Passed 0.106	Passed 0.200	Passed 0.109	Passed 0.248	Passed 0.284	Passed 0.188	Passed 0.167	Passed 0.050	Passed 0.249	Passed 0.023	Passed 0.028	Passed 0.541
Sdev.	Passed 1.145	Passed 0.555	Passed 0.909	Passed 0.843	Passed 0.776	Passed 0.800	Passed 0.508	Passed -0.307	Passed 0.197	Passed 0.234	Passed 0.190	Passed 0.582	Passed -0.237
Cs.	Failed -2.065	Passed 0.426	Passed 0.568	Passed 1.123	Failed 0.315	Passed -0.404	Passed -0.432	Passed -0.616	Passed 0.359	Passed -0.485	Passed 0.291	Passed -0.875	Passed -0.727
Ck.	Failed -4.898	Passed 0.930	Passed 0.317	Passed 1.038	Passed -0.790	Passed -0.841	Passed -1.461	Passed -0.844	Passed 0.743	Passed -1.104	Passed 0.163	Failed -3.334	Failed -2.267
SC1	Passed 1.545	Passed 0.705	Passed -0.376	Passed -0.229	Passed -0.351	Passed 0.083	Passed 0.322	Passed -0.018	Passed 0.023	Passed 0.472	Passed 0.056	Passed 0.688	Passed -0.074

STATISTICAL TESTING AGAINST HISTORICAL DATA
Tocumwal rainfall.

Passed ⇒ Passed the test. Failed ⇒ Failed the test.

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	Passed 0.277	Passed -0.021	Passed 0.091	Passed 0.098	Passed 0.289	Passed 0.222	Passed 0.033	Passed -0.094	Passed 0.019	Passed 0.385	Passed 0.034	Passed -0.032	Passed 0.314
Sdev.	Passed 1.151	Passed -0.048	Passed 0.403	Passed 0.430	Passed 0.592	Passed 0.796	Passed -0.058	Passed -0.513	Passed -0.013	Passed 0.363	Passed 0.223	Passed 0.203	Passed -0.430
Cs.	Passed -0.404	Passed -0.396	Passed 0.341	Passed 0.443	Passed -0.375	Passed -0.558	Passed -0.157	Passed -0.125	Passed -0.573	Passed -0.355	Passed 0.172	Passed 0.259	Passed -0.613
Ck.	Failed -3.003	Passed -1.214	Passed -0.072	Passed 0.491	Passed -1.089	Passed -0.373	Passed 0.161	Passed -0.397	Passed -0.976	Passed -0.774	Passed -0.080	Passed 0.502	Passed -0.974
SC1	Passed 1.245	Passed -0.198	Passed -1.007	Passed 0.379	Passed 0.025	Passed -0.580	Passed 0.737	Passed 0.298	Passed -0.103	Passed -0.028	Passed 0.747	Passed 0.301	Passed -0.149

Bibliography

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ADDENDUM

MANAGEMENT OF THE RIVER MURRAY DURING PERIODS OF EXTENDED DROUGHT

1. Behaviour has been spelled behavior throughout this thesis.

2. Table title on page 71 should read "Table 7.2: Statistics for the historical data for Kiewa inflows".

3. Page 5, paragraph 1, add after South Australia "(as shown in Appendix A)".

4. Page 5, line 15, "restriction" should read "restrictions".

5. Page 6, paragraph 1. This paragraph should not be separate but continue from the last paragraph on page 5.

6. Page 6, paragraph 1, add to end of paragraph "by South Australia".

7. Page 13, last line, "ot" should be "of".

8. Page 14, line 2. After distributions add "used in synthetic hydrology".

9. Page 14, paragraph 2. "Yevjevich, (1976) [31]" should read "Yevjevich, (1976) [36]".

10. Page 16, line 2. The bounded type of distribution discussed here is for time series such as pumping data when particular upper and lower bounds are obvious. This is not to imply that bounds such as non-negativity have not been used as necessary.

11. Page 20, line 17. "Fiering and Jackson, (1971)" should read "Fiering and Jackson, (1971) [11]".

12. Page 21, line 10. The use of the terminology "limiting assumption" is not used to indicate a lack of usefulness of the lag one model, especially for monthly stream flow data. However, if significant temporal correlation is evident, the lag one model may not represent the time series well.

13. Page 21, line 15. This paragraph is not intended to reject the Markov lag one model. It points out a further difficulty with the model which is discussed in the following paragraph.

14. Page 21, last paragraph. This paragraph should be joined with the previous paragraph.

15. Page 22, line 14, "persistance" should read "persistence".

16. Page 22, line 23 and page 286, reference [26], "Randkivi" should read "Raudkivi".

17. Page 23, last paragraph. Add to end of paragraph "The statistics

shown in Appendix F show the data to be non-normal. Also, as shown in Appendix E, very few of the parameters of the transformation are close to zero, indicating the unacceptability of the log-normal distribution.

18. Page 26, lines 15 and 16, "Barratt and Close, 1983 [3]" should read "Barratt and Close, 1983 [2]".

19. Page 38, sentence 1. Add to end of sentence "as shown in Appendix F."

20. Page 39, paragraph 1. The need to not carry out significance testing here refers to evaluation of the data after transformation.

21. Page 39, last two lines, delete the word "arbitrarily".

22. Page 40, line 8. The automated transformation process worked within the parameter bounds of equations (4.9) and (4.10) as indicated. The "fine tuning" process was an interactive computer process which allowed selection of various transformation parameters without bounds being applied. The value of -1.5 was selected so as not to obscure the historical time series.

23. Page 40, paragraph 2. For those data sets which would not transform well, selected historical data was used in the generation process as discussed in Section 5.7. The lack of success was attributed to the highly regulated nature of the Loddon River and poor sampling methods for the evaporation data as discussed in Section 5.2.

24. Page 41, line 15. Change "estimated" to "calculated".

25. Page 42, line 9. Delete this line and replace with "which produced zero skewness and a coefficient of kurtosis as close as possible to 3 were selected."

26. Page 43, last paragraph. The "unsatisfactory" method came about because many of the data sets were transformed to large values and the variance reduced. This meant that roundoff errors became significant. This prompted the need for the two stage method.

27. Page 44, paragraph 2. Not all the lag 12 correlations were significant. This can be seen in the correlograms of Appendix G. However, when viewing all the lag 12 correlations (temporal and areal), many are significant and hence they were incorporated into the model.

28. Page 44, second last line. The method used was considered better as it allowed similar use of transformed data (using power transforms). It also correlated to the corresponding month in the previous year, rather than to the annual data. This is a better approach for the River Murray system.

29. Page 48. See also derivation of A, B and C matrices in Appendix B which show the need for the various M matrices.

30. Page 49, third last line, "enteries" should read "entries".

31. Page 61. Reference to Figures 6.1 and 6.2 shows a generalised view of the analysis. The results of the analysis are tabled in Appendix K.

32. Page 70, paragraph 3. Reference to "Darling flows" is synonymous with "Inflow to Menindee Lakes".

33. Page 70, paragraph 4. Adequacy of generation of data is demonstrated by the summary statistics shown in this Chapter, in particular Tables 7.1 to 7.6 and also in Appendices H,I,J and L.

34. Page 72. The values shown in the table are the calculated "t" statistic used for the test.

35. Page 78, last line, "to few" should read "too few".

36. Page 81, 5th last line. "usefull" should read "useful".

37. Page 82, line 14. "sellect" should read "select".

38. Page 82, 6th last line. "decission" should read "decision".

39. Page 82, 4th last line. "becomming" should read "becoming".

40. Pages 148 and 149. "abreviation" should read "abbreviation" and "abreviations" should read "abbreviations".

41. Page 149, tabulation and abbreviations, the numbers refer to the following abbreviations:

1 - MDSNWY	6 - HUNREG	11 - MDRNDN
2 - MDMRGT	7 - OVENMD	12 - MDRNKR
3 - MDDART	8 - MURRUM	13 - MDRNTC
4 - MDHUME	9 - INFMEN	
5 - MDKIEW	10 - MDBCGR	

42. Pages 249 to 269. "occurrance" should read "occurrence"