

CASE STUDY: The History of Water Supply on the Central Coast

APPENDIX 4: Extracts from pages 3 to 8 of “Hydrology” Volume 2 of Report No 1 of the Gosford-Wyong Water Supply Project Section entitled “Report on Investigations for Water Supply to the Gosford-Wyong Region”, January 1975, Department of Public Works N.S.W. (*see page 8*)

2. REVIEW OF HYDROLOGICAL DATA

2.1. INTRODUCTION

The principle streams in Gosford and Wyong Shire comprising Wyong River, Ourimbah Creek, Mooney Mooney Creek as well as major rivers in neighbouring catchments comprising the MacDonald River, Colo River and Wollombi Brook have been considered as potential sources for supplying water to Gosford and Wyong Region....

The following review of hydrological data is therefore discussed from this viewpoint:

- The reliability of recorded streamflow at the potential source stream.
- The duration and reliability of streamflow data utilized for extending recorded streamflow at the source of the streams.
- Rainfall data which may be used to provide an index of catchment rainfall for use in estimating catchment streamflow.
- Evaporation data to provide an estimate of catchment evaporation for use in estimating streamflows.

2.2. STREAMFLOW

... The following factors are common to all stations and result in inaccuracy in the recorded streamflow:

- Infrequent stream gauging (average of once per two months or less).
- Nil or very few gauging at high flows.
- Missing records due to discontinuous reading of staff gauges and to failure of recorders (almost invariably pressure recorders).
- Changing control at the gauge site.

The extent to which a particular gauging station has been affected by the above factors will greatly influence the accuracy of a recorded streamflow....

2.2.2 *Stream Gauges in Gosford and Wyong Shires*

a) *Wyong River*

Wyong River is the principal source in Gosford and Wyong Shires and flows have been recorded at the following locations:

Wyong Creek - May 1959 to May 1966 - Staff gauge, catchment of 246 square kilometres, very few missing months.

Wyong Weir - June 1966 to December 1971- float recorder, catchment of 356 square kilometres, few missing records. Collapsible gates installed on Wyong Weir in 1971 have made this gauge suitable only for recording large floods.

Gracemere - December 1972 to date - dulpex pressure recorder, catchment 236 square kilometres, no missing records.

The value of the Wyong River stream gauging has been diminished by the necessity to relocate the gauging station i.e. estimation of flow from one gauge to another has introduced an additional uncertainty.

The relocation of the gauging station in the middle of the severe 1965-66 drought was particularly unfortunate and the 8 months of missing record in 1965 result in a loss of extremely valuable information. If this record were available it would be possible to be much more confident about any subsequent streamflow estimates because of the severity of this 2 year drought which was the most severe recorded in many coastal streams in N.S.W.

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b) Ourimbah Creek

The Ourimbah Creek gauge is a float recorder with a catchment of 150 square kilometres, and has been operating continuously since October 1965. This is a relatively accurate stream gauging station and the main disadvantage is the short length of record available at the time of analysis (until 1971) and the fact that the record did not include a long, severe drought.

c) Mangrove Creek

October 1970 to date - pressure recorder, catchment of 202 square kilometres no missing records.

The station has been gauged very extensively and although there have been substantial shifts in the alluvial control, the recorded flow is considered accurate and the main disadvantage is the extremely short duration of recorded flow.

d) Mooney Dam

An operational record has been kept at Mooney Dam from March 1965 to February 1968 on a weekly basis. Unfortunately, the early part of the 1965-66 drought was missed and it is considered that the operational record is only effective when water level in the dam is several millimetres below the spillway as the weekly record is inadequate for estimation of overflows. From 1968 a daily operational record has been kept and this has provided much better estimates of streamflow into the dam, although the record is still doubtful when the dam is overflowing by more than about 50 millimetres.

2.2.3 Major Rivers

a) MacDonald River

The MacDonald River is the nearest major source to Gosford and Wyong Shires with a catchment area of 1 735 square kilometres at St. Albans. A staff gauge has been installed since October 1954, but there are long periods of missing records especially during 1954-57 and 1960-61. A servo manometer pressure recorder was installed in 1969 but considerable records have been lost since this date due to failure of the recorder. There has been very little gauging of high flows on the MacDonald River, making high flow values questionable.

b) Colo River

A staff gauge was installed on the Colo River in 1909; however, it was closed during the depression years and lost the extremely severe 1935-42 drought.

c) Wollombi Brook

A staff gauge has been installed on the Wollombi Brook at Warkworth since 1908. The catchment area is about 1 735 square kilometres and there is a large missing period during 1950-1954.

2.2.4. Other Stream Gauging Stations

The other stream gauging stations were utilized to extend the streamflow records of the potential source streams using multiple regression techniques. Where a choice was available, the more accurate stations were utilized in the regression analysis with preference being given to stations with long continuous records.

2.3. RAINFALL

The rainfall data.... was utilized for estimating a catchment rainfall index for streams in Gosford and Wyong Shires and for the MacDonald River. Very few rainfall stations with long records were found within the catchments and the Thiessen method or similar was used to estimate the catchment rainfall, usually from 2 or 3 stations close to the catchment boundary.

Rainfall records in Gosford and Wyong Shires were checked using Double-Mass Analysis to determine inconsistencies in the recorded rainfall which may be caused by changes in gauge location exposure or observational procedure. All stations were found to be consistent and it was not necessary to adjust or discard any records.

2.4. EVAPORATION

The evaporation stations considered are shown in Table 3. Because of the fairly limited variation in evaporation within a region, it was assumed that Prospect Dam evaporation would provide a reasonable estimate of evaporation for the catchments considered. Comparison of adjacent evaporation stations would often show discrepancies but these are not considered significant in the streamflow estimation discussed in Chapter 3.