

3 QUALITY ASSURANCE PROGRAMS

Assessment of Visual Pollution:

Council lifeguards were contracted by Beachwatch to conduct twice daily inspections of Sydney's beaches for sewage and stormwater pollution during the Summer Season 1994-95. The lifeguards use the Beachwatch Beach Pollution Assessment Guidelines for the inspections.

Beachwatch conducted a Beach Pollution Monitoring (BPM) program to ensure consistency of reporting for sewage and stormwater pollution according to the Beachwatch Beach Pollution Assessment Guidelines. The BPM program involves two components:

- routine inspection of beaches by Beachwatch staff with the aim of providing feedback to council lifeguards to ensure assessments are accurate and consistent.
- responding to and investigating reports of specific beach pollution incidents reported by council lifeguards or members of the public. An updated Beachwatch Bulletin may be issued as a result of these inspections.

This season, Beachwatch initiated a quality assurance (QA) program including joint beach pollution assessments with council lifeguards. The aims were:

- to allow immediate liaison with council lifeguards
- to identify any potential sources of error with the inspections thus minimising the assessment subjectivity.
- to eliminate the time difference between the independent inspections. This time difference can be used to explain differences in the two inspections.

The overall BPM program resulted in 717 beach inspections by Beachwatch staff this season, with 161 of these being joint inspections with council lifeguards. The results of the BPM program are summarised in table 3.1.

One issue identified as a result of the BPM program was the determination of whether stormwater debris present on the tide lines consisted of new or old indicators. This can be difficult to determine as stormwater debris from the previous day can be washed back out to the surf zone and re-deposited on the next high tide line. Considerations such as rainfall and tide times over the previous 24 hours are important in determining whether the debris is new stormwater material or old stormwater litter.

Overall, agreement between the council lifeguards and Beachwatch scientific officers averaged 95% for the season. Although agreement between Beachwatch and council inspections were on average high, the majority of inspections did not reveal any visible sewage or stormwater pollution. Of the 717 BPM inspections, 95.8% of sewage

Table 3.1. Agreement Between Beachwatch and Council Visual Assessments

| <i>Visual Indicator</i> | <i>Percent Agreement</i> |
|-------------------------|--------------------------|
| Sewage | 98.4 |
| Stormwater | 95.4 |
| Water discolouration | 96.4 |
| Litter (old stormwater) | 87.4 |
| Stormwater ponding | 98.5 |
| Stormwater staining | 99.0 |
| Marine stingers | 90.8 |
| Algae | 94.0 |
| Seaweed | 95.1 |

assessments and 80.3% of stormwater assessments were in the 'Nil' or 'Trace' category. These categories are not reported in the daily Beachwatch Bulletin.

The cost-benefit of continuing with visual inspections is under review. Results of council beach inspections this season indicate that the majority of inspections did not reveal any sewage or stormwater indicators (Figures 3.1 and 3.2).

The lack of visual indicators present decreases the confidence in predicting bacterial contamination at Sydney's beaches. This is discussed in detail in section 4.3.

Bacterial Density Quality Assurance Program:

Since February 1993, Beachwatch has undertaken a Quality Assurance Program for bacterial density analysis. Six laboratories, including the laboratory contracted for all routine analysis, have participated during at least part of this period. Each round in the QA Program consisted of three samples being delivered to each of five laboratories.

For each sample, the results for each laboratory were compared with the consensus mean for that sample and the deviation from the mean was calculated. The consensus mean was calculated as the geometric mean of the five results for each sample.

Laboratories were compared by calculating the distribution of the log deviation from the consensus mean of each sample (except control blanks). This shows if there is a trend of a laboratory's results being consistently higher or lower than average and of the variability of results.

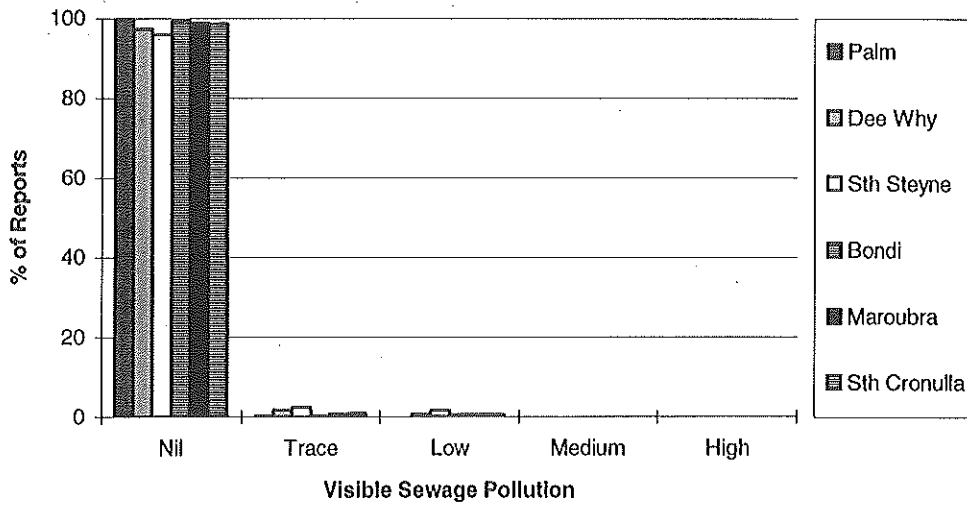


Figure 3.1 Visible sewage pollution (summer 1994/95)

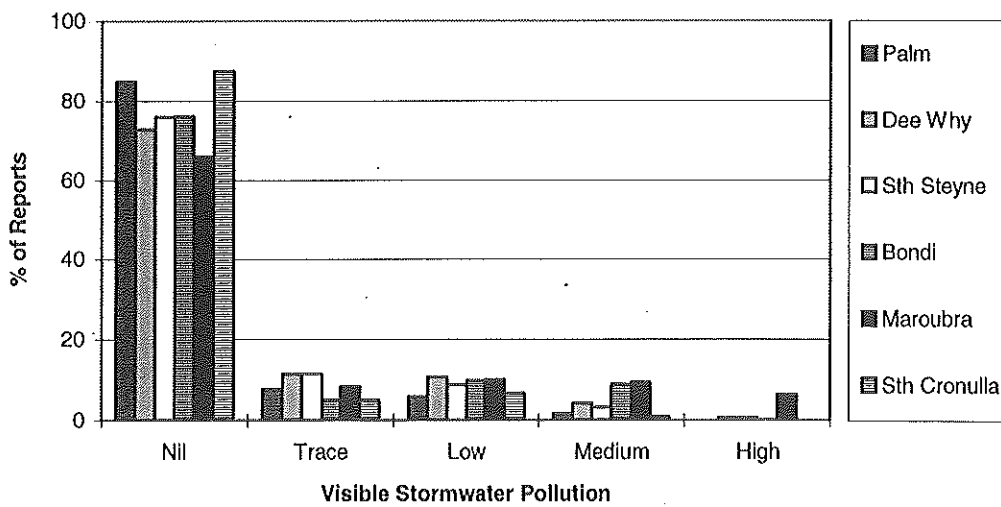


Figure 3.2 Visible stormwater pollution (summer 1994/95)

The results are illustrated in Table 3.2 and Figure 3.3. The contracted laboratory had a median deviation of -0.03 log units for faecal coliforms and -0.01 log units for enterococci. This means that for both bacterial indicators the results are evenly distributed around the consensus mean.

Table 3.2 Data distribution of log deviation from the consensus mean for each laboratory and bacterial group

Data set size is the total number of samples this analysis is based on for each laboratory. The contracted laboratory is #1.

| | Faecal coliforms | | | | | | Enterococci | | | | | |
|---------------|------------------|-------|-------|-------|-------|-------|-------------|-------|-------|-------|-------|-------|
| | #1 | #2 | #3 | #4 | #5 | #6 | #1 | #2 | #3 | #4 | #5 | #6 |
| Data Set Size | 91 | 91 | 91 | 76 | 45 | 33 | 91 | 91 | 91 | 73 | 43 | 33 |
| 90th % | 0.30 | 0.48 | 0.29 | 0.31 | 0.37 | 0.22 | 0.53 | 0.24 | 0.36 | 0.49 | 0.27 | 0.45 |
| 50th % | -0.03 | 0.13 | 0.02 | 0.01 | 0.02 | -0.24 | -0.01 | 0.03 | -0.04 | 0.11 | -0.09 | -0.13 |
| 10th % | -0.36 | -0.12 | -0.43 | -0.45 | -0.28 | -0.75 | -0.26 | -0.34 | -0.46 | -0.22 | -0.42 | -0.69 |

Variation (range from 10th to 90th percentiles) across the six laboratories averaged 0.73 log units for faecal coliforms and 0.79 log units for enterococci. The contracted laboratory had a lower variation for faecal coliforms (0.66 log units) with even distribution but equalled the average variation for enterococci with the data slightly skewed to higher values.

The conclusions that can be drawn from the results to date are that Beachwatch bacterial density data derived from analysis of water samples by the contracted laboratory are unlikely to be greatly different if analysed by most other reputable laboratories in this study.

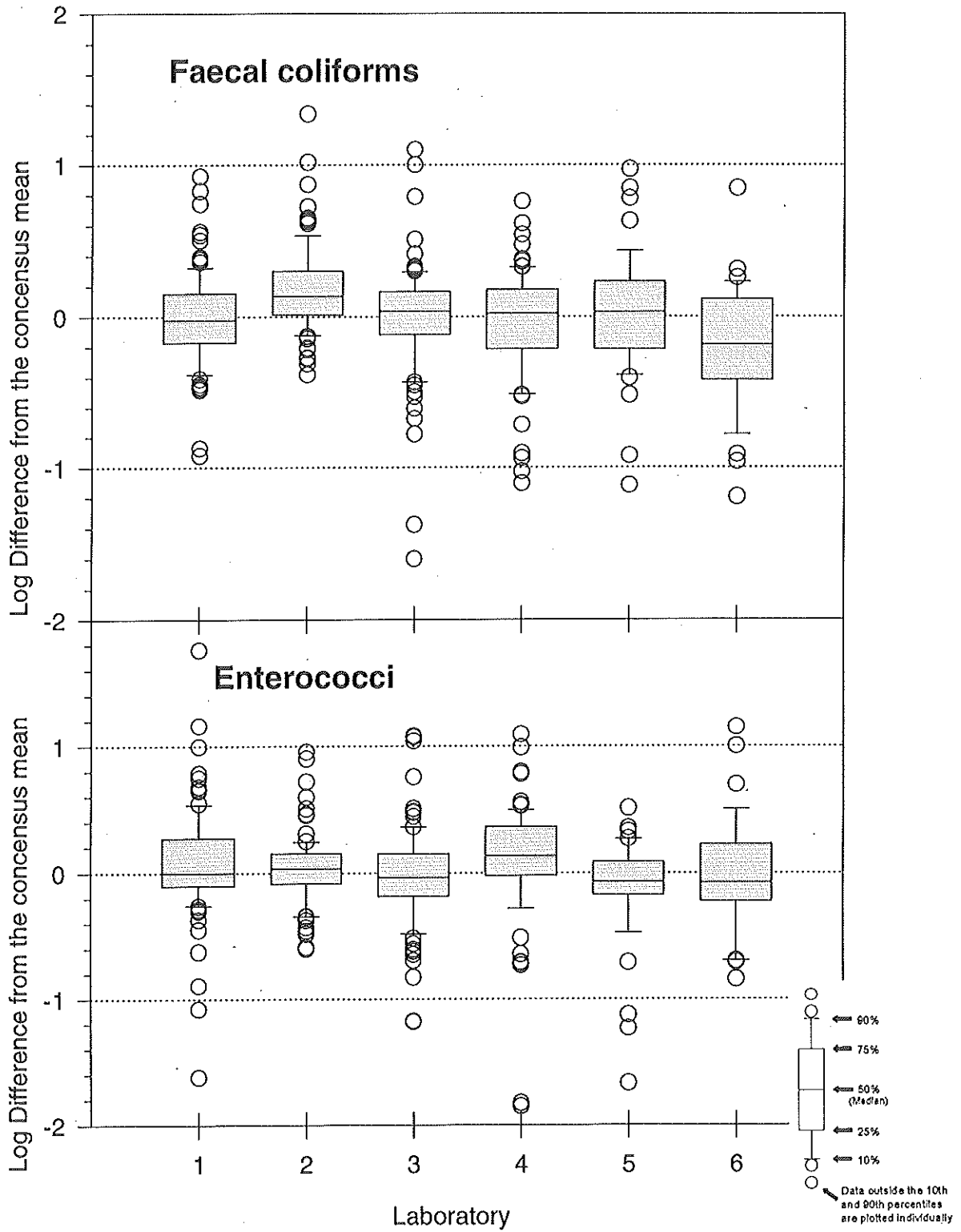


Figure 3.3 Data distribution of log deviation from the consensus mean for each laboratory and bacterial group.

The contracted laboratory is #1.