

## 9. RESULTS

### 9.1 General Water Quality Study

The raw data is compiled in Appendix 2, one sheet for each sampling site. A number of pieces of data are missing due to malfunctioning instruments on sampling trips, bad weather on 24 January preventing deep water sampling, some parameters not measured on the early sampling trip and some data eliminated due to unreliability.

Table 3 summarizes the data in terms of mean values, standard deviations and ranges for parameters for sites S5 to S14. Table 1 summarizes comparable data from other areas in GBR waters. There is some reservation about using arithmetic means to summarize data such as this due to its common non-normal distribution (Talbot & Simpson, 1983) but since most comparable data from the GBR (see Table 1) have been summarized in this way it will be used in this report. However later analysis of the data for comparative purposes with future monitoring results may use other types of averaging which are more satisfactory.

Mean values from the pilot variability study are shown in Table 4.

### 9.2 Sediment/Turbidity Study

The raw data is compiled in Appendix 3. Many Secchi disc clarity measurements are shown as >n. In these cases of course the Secchi depth was greater than the total depth and no true vertical Secchi depth could be measured. To test whether horizontal Secchi disc measurements, which could be used in shallow water, were comparable to vertical measurements at the same site, a small trial was carried out on 16.2.1989. Four stations to one side of the shipping channel were chosen and horizontal and vertical measurements taken.

Table 3. Data Summary (Sites S5 to S14)

<u>Parameter</u>	<u>Data Points</u>	<u>Mean</u>	<u>S.D.</u>	<u>Range</u>
Suspended Solids (Sediment study)(mg/l)	335	3.95	4.29	0.3 - 47.2
Suspended Solids (W.Q. study)(mg/l)	53	3.62	2.88	0.2 - 15.7
Nitrite-N ( $\mu\text{g-at/l}$ )				
Surface	31	0.90	0.61	<0.07 - 3.1
Depth	12	0.90	0.44	0.50 - 2.0
Total	43	0.90	0.56	<0.07 - 3.1
Nitrate-N ( $\mu\text{g-at/l}$ )				
Surface	31	0.84	0.33	0.21 - 2.1
Depth	12	0.91	0.34	0.50 - 2.0
Total	43	0.86	0.33	0.21 - 2.1
Ammonium-N ( $\mu\text{g-at/l}$ )				
Surface	31	0.49	0.53	0.07 - 2.8
Depth	11	0.46	0.19	0.21 - 0.79
Total	42	0.48	0.46	0.07 - 2.8
Phosphate-P ( $\mu\text{g-at/l}$ )				
Surface	33	0.20	0.20	0.03 - 1.1
Depth	12	0.55	1.4 <sup>+</sup>	0.03 - 4.8
Total	45	0.29	0.71	0.03 - 4.8
Silicate-Si ( $\mu\text{g-at/l}$ )				
Surface	31	3.7	1.6	1.6 - 7.3
Depth	11	2.7	0.75	1.9 - 4.3
Total	42	3.4	1.5	1.6 - 7.3
BOD <sub>5</sub> (mg/l)	45	1.1	0.64	0.02 - 2.8
Copper ( $\mu\text{g/l}$ )				
Surface	42	1.61	1.76	<0.07 - 8.0
Depth	10	4.25	4.53	0.68 - 16
Total	52	2.12	2.68	<0.07 - 16
Total Phosphorus ( $\mu\text{g-at/l}$ )				
Surface	31	0.63	0.37	0.19 - 2.0
Depth	13	0.69	0.26	0.39 - 0.9
Total	44	0.64	0.34	0.19 - 2.0
Particulate Nitrogen( $\mu\text{g-at/l}$ )				
Surface				
Depth				
Total				
Chlorophyll a (mg/l)	18	0.59	0.54	0.05 - 2.0
Aromatic Hydrocarbons $\mu\text{g/l}$ chrysene equivalents	11	0.47	0.62	0.1 - 2.0

+ High SD for phosphate mostly due to one very high result.  
Without this value the total results appear as: Mean 0.19, S.D. 0.18

Table 4. Parameter mean values in the pilot variability study

<u>Parameter</u>	<u>Temporal Study</u>	<u>Spatial Study</u>
Suspended solids (mg/l)	2.8	2.3
Nitrate ( $\mu\text{g-at/l}$ )	0.29	0.23
Nitrite ( $\mu\text{g-at/l}$ )	0.79	0.83
Ammonia ( $\mu\text{g-at/l}$ )	0.57	0.76
Orthophosphate ( $\mu\text{g-at/l}$ )	0.19	0.17

The results shown in Table 5 suggest that in this case the difference is small and there is good correspondence between the vertical and horizontal readings.

Table 5.

<u>Site</u>	<u>Horizontal Value (m)</u>	<u>Vertical Value (m)</u>
HS1	2.7	2.5
HS2	3.2	3.0
HS3	2.5	2.3
HS4	1.5	1.9

## 10. DISCUSSION

### 10.1 General Water Quality

The purpose of the baseline study was to gain a measure of the ambient, natural levels of a number of parameters in Nelly and Geoffrey Bays as possible future impact sites and Florence, Arthur and Picnic Bays as reference sites. Each of the parameters will be examined in turn and general comments made where appropriate.

#### 10.1.1 Dissolved oxygen, salinity and temperature

Dissolved oxygen levels in the marine sites are uniformly high and show no changes with depth. There is also uniform salinity and little thermal