4.4.1.4 *SASS4 Scores, number of taxa and ASPTs for each Reference Group*

SASS4 Scores, number of taxa and ASPT values were calculated for each Reference Group, based on the composite SASS Scores for each site (i.e. biotope and season combined). Since SASS data for three seasons have been combined for each site, SASS Scores will be elevated above what would normally be expected during a single-season assessment. The intention is to provide insight into potential differences in SASS Scores amongst Reference Groups and to develop a basis with which future comparisons can be made (i.e. separate-biotope and separate-season assessments). Median SASS4 Scores, number of taxa and ASPTs for each Reference Group, including sub-groups, are given in Figure 4.7.
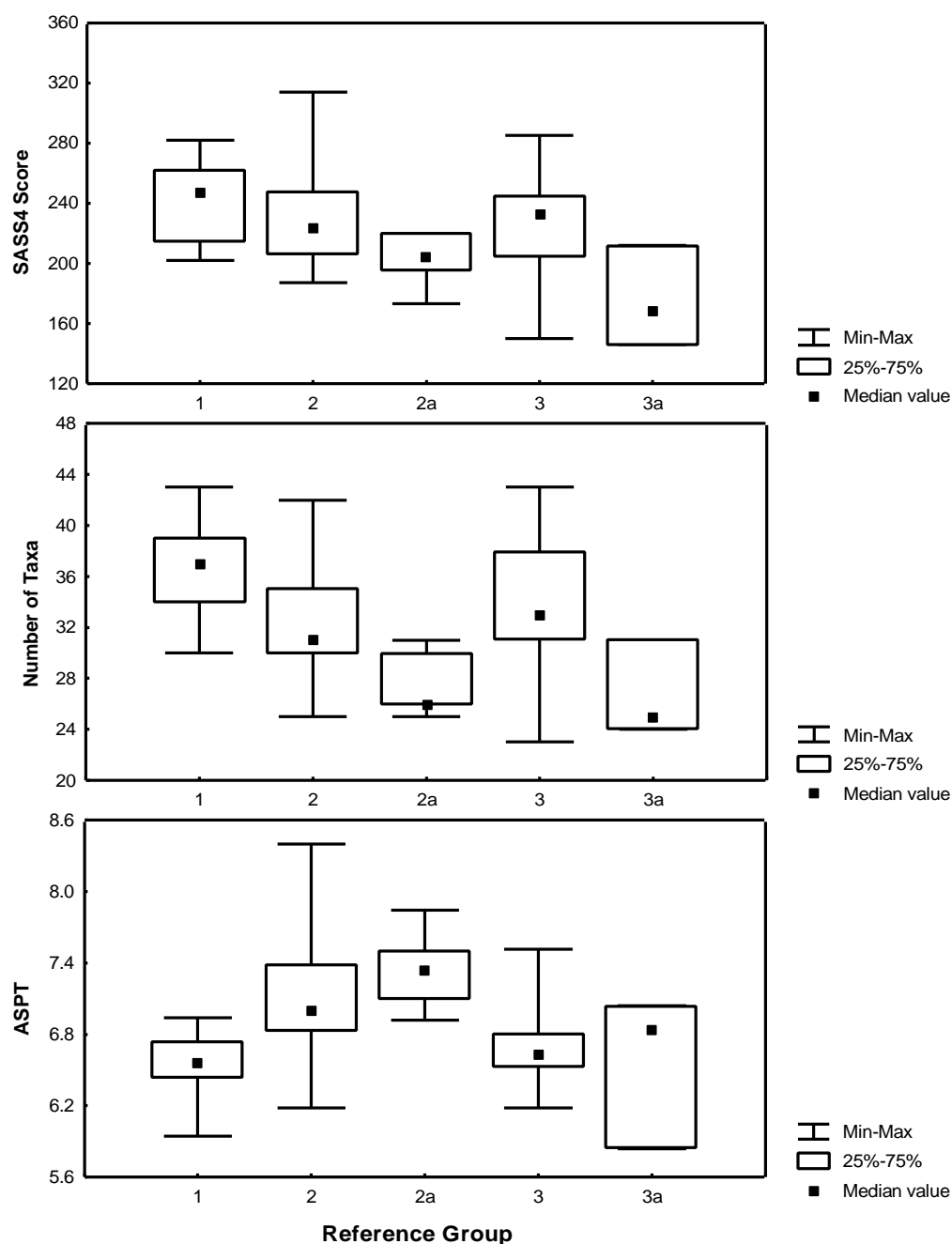

Figure 4.7 Box-and-whisker plots of median SASS4 Score, number of taxa and ASPT for composite Reference Groups 1, 2 and 3 and sub-groups 2a and 3a.

There were significant differences between Reference Groups in each metric (SASS4 Score: Kruskal-Wallis Test statistic H = 10.298, p < 0.05; number of taxa: H = 16.716, p < 0.01; ASPT: H = 18.638, p < 0.01).   Closer examination of differences between pairs of Reference Groups (Kolmogorov-Smirnov Test) revealed that these differences were largely attributed to differences between Reference Groups 1 and 2, Reference Group 1 and sub-group 2a, and Reference Group 1 and sub-group 3a for number of taxa, and Reference Groups 1 and 2, Reference Group 1 and sub-group 2a, Reference Groups 2 and 3, and sub-group 2a and Reference Group 3 for ASPT.   Differences between pairs of Reference Groups with respect to SASS4 Scores were not significant.

4.4.2 Environmental variables

Discriminant Function Analysis enabled a subset of environmental variables which provided maximum discrimination between Reference Groups to be identified.   Subsets were derived for two sets of Reference Groups, one excluding sub-groups (n = 3) and one including sub-groups (n = 5).   These are given for each set of Reference Groups (Table 4.8) and are numbered in decreasing importance in predictive power, i.e. 1 has the greatest predictor potential (PP), whilst 11 has the lowest predictor potential.

Table 4.8   Subset of environmental variables which provided maximum discrimination between Reference Groups. Potential predictor (PP) variables used in discriminating between Reference Groups and their order of acceptance are shown. A: 3 Reference Groups, B: 3 Reference Groups and 2 sub-groups. Variables prefixed with an L were log-transformed in the DFA.

Variable Type	Variable	Code	PP	
			A	B
Catchment variable	Longitude	LONG	2	3
	Altitude	LALT	1	1
	Distance from source	LDIS	8	8
Site variable	Stream width	LW	9	10
	Shallow-water habitat: mean depth	LSAVG	7	6
	Vegetation-type (1-9)	VEG	4	4
Habitat variable	Substratum composition (1-4)	SUBCOMP		11
	% Bedrock	BR	3	2
	% Gravel/sand/mud	GSM	5	7
	% SIC/SOOC	SIC/SOOC		5
Water chemistry variable	Temperature (^{o}C)	TEMP	6	9

The classification of sites into Reference Groups based on invertebrate community data was validated by examining the percentage of sites within each Reference Group that were correctly classified on the basis of the above environmental variables. 96% of the sites were correctly classified for both subsets (Table 4.9).   When no sub-groups were separated, ten of the 11 sites in Reference Group 1 were correctly classified, 33 of the 34 sites in Reference Group 2 were correctly classified, and all of the sites in

Reference Group 3 were correctly classified. The site, B4WATE-TWEEF, was classified as a Reference Group 1 site not Reference Group 2, whilst site X2CROC-GOEDE was classified as a Reference Group 2 site not a Reference Group 1. In other words, on the basis of the environmental characteristics of these sites they had greater affinity to a different Reference Group. When sub-groups were considered separately, ten of the 11 sites in Reference Group 1 were correctly classified, 28 of the 29 sites in Reference Group 2a were correctly classified, and all of the sites in sub-group 2a, Reference Group 3 and sub-group 3a were correctly classified.

Table 4.9   Predicted classification of sites into Reference Groups and sub-groups based on the subset of environmental variables. The number of sites in each Reference Group or sub-group which have been correctly classified are shaded.

Reference Group	No sub-groups				Reference Group	With sub-groups					
	%	1	2	3		%	1	2	2a	3	3a
1	91	10	1	0	1	91	10	1	0	0	0
2	97	1	33	0	2	97	1	28	0	0	0
					2a	100	0	0	5	0	0
3	100	0	0	12	3	100	0	0	0	9	0
					3a	100	0	0	0	0	3
Total	96	11	34	12	Total	96	11	29	5	9	3

4.4.2.1   *Descriptive statistics for environmental variables*

Mean, standard deviation (SD), median, 25th and 75th percentile values were calculated for selected environmental variables for each Reference Group, including sub-groups (Table 4.10). The 25th and 75th percentiles of a variable is a value such that 25% and 75% of the values of the variable fall below that value respectively. Most variables were significantly different (Kruskal-Wallis, $p < 0.05$) amongst groups.