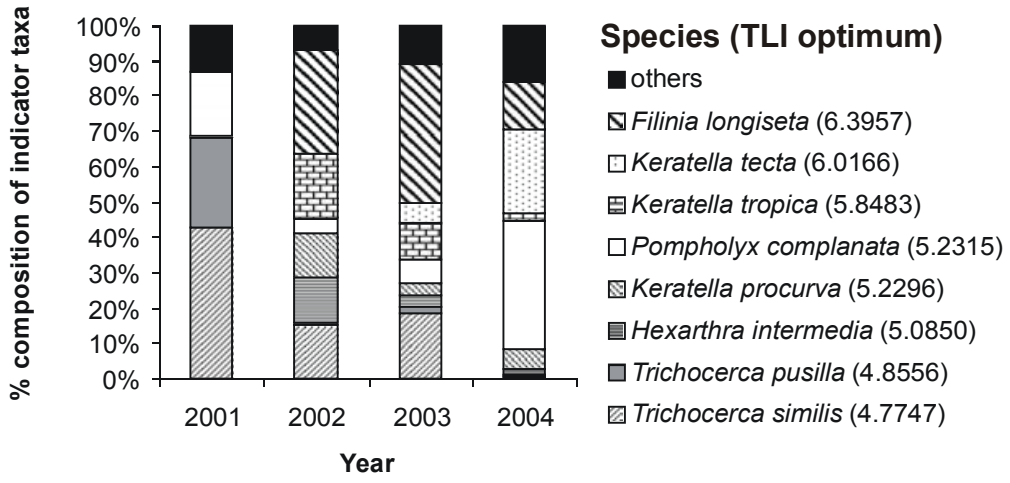

Figure 9: Comparison of percent composition of dominant (comprising > 10% of assemblage over any year) rotifer indicator species from Lake Spectacle. Taxa are ordered on the graph from highest TLI optima (bottom) to lowest TLI optima (top).

4 General conclusions

Inferred trophic states of the monitored lakes of the Auckland Region based on rotifer assemblages were in general ranked in a similar manner throughout the study period; Lake Ototoa > Lake Tomarata > Lake Wainamu > Lake Pupuke > Lake Kuwakatai > Lake Spectacle. Lake Kereta was highly variable in its assessment. In the development of the rotifer community index for assessment of lake trophic state (Duggan et al. 2001b), six of the seven lakes assessed here were used in development and subsequently assessed (Lake Kereta was not assessed at this time because only two samples were collected).

Comparisons with inferred trophic state based on rotifer communities from the current study with those collected between May 1997 and March 1998 indicate that over this period Lake Ototoa has improved, having been assessed as mesotrophic in the earlier study. Similarly, Lake Kuwakatai was assessed at that time as supertrophic, and as such also has an improved trophic state. In contrast, Lake Spectacle has changed from supertrophic in 1997/1998 to highly hypertrophic, now having assessed trophic states as poor as the worst lakes used in development of the technique (Lakes Waahi and Horowhenua). The assessed trophic states of the remaining lakes (Lake Tomarata on the oligo- to mesotrophic boundary, Lake Wainamu mesotrophic, and Lake Pupuke eutrophic) have all remained more or less the same since the development of the index.

Inferred trophic states generally changed little between the beginning and end of the current study, except Lake Spectacle which appears to have become more degraded, and Lake Kereta which was highly variable and apparently improved in water quality. However, a general increase in inferred TLI occurred for many lakes in 2003 as a result of increases (or decreases) in the relative abundances of different rotifer taxa in most lakes. Such consistent changes in assessments - based on different species in each lake - likely reflects a change in conditions that acted across the region, e.g., weather patterns that lead to higher production or algal (food) biomass. Possible reasons for this include warm stable conditions leading to the presence of surface algal blooms. Interpretation of rotifer inferred trophic states for the ARC lakes, and the changes in each through the study period, are deliberately presented here independently of water quality data. Discussion here of the possible proximate causes for the observed dynamics is therefore necessarily limited. An analysis of trophic state and trend of the seven monitored Auckland Region lakes using traditional physical and chemical water quality variables can be found in ARC technical Publication No. 268 (ARC, 2005).

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Appendix 1

List of "indicator" and "other" rotifer species recorded during this survey. Indicator taxa are ordered based on TLI optima from lowest to highest. Lakes are distributed from approximately lowest to highest TLI.

	TLI optima	Ototoa	Tomarata	Wainamu	Pupuke	Kuwakatai	Kereta	Spectacle
Indicator taxa								
Conochilus dossuarius	3.0989	x						
Synchaeta longipes	3.3232	x	x					
Polyarthra dolichoptera	3.4396	x		x	x	x	x	x
Trichocerca stylata	3.7553		x		x	x		
Conochilus coenobasis	3.9056		x	x				
Ascomorpha ovalis	3.9558	x	x	x	x	x	x	x
Lecane closterocerca	4.1376					x	x	x
Lecane bulla	4.1650	x	x	x	x	x	x	x
Testudinella patina	4.3055			x		x		x
Synchaeta oblonga	4.3875			x	x			x
Asplanchna priodonta	4.4042	x	x	x	x	x	x	x
Anuraeopsis navicula	4.4189		x					
Synchaeta pectinata	4.5011		x	x				x
Collotheca sp.	4.5186	x	x	x	x	x	x	x
Filinia pejleri	4.5193		x	x		x		x
Filinia terminalis	4.5290							x
Hexarthra mira	4.6060		x	x	x			x
Euchlanis dilatata	4.6850						x	x
Asplanchna brightwelli	4.6949				x			x
Trichocerca tenuior	4.6982	x					x	x
Trichocerca similis	4.7747	x	x	x	x	x	x	x
Anuraeopsis fissa	4.8205							x
Keratella cochlearis	4.8324				x	x	x	x
Filinia novaezealandiae	4.8392	x						x
Trichocerca longiseta	4.8412				x			
Trichocerca pusilla	4.8556	x			x			x
Hexarthra intermedia	5.0850	x	x	x				x
Keratella procurva	5.2296			x	x	x	x	x
Pompholyx complanata	5.2315	x	x	x	x	x	x	x
Asplanchna seiboldi	5.6245		x					
Keratella tropica	5.8483				x	x		x
Keratella slacki	5.9414							x
Keratella tecta	6.0166							x
Filinia longiseta	6.3957				x			x

	Ototoa	Tomarata	Wainamu	Pupuke	Kuwakatai	Kereta	Spectacle
Other rotifers							
Bdelloids	x	x	x	x	x	x	x
Brachionus angularis							x
Cephalodella gibba						x	
Cupelopagis vorax			x			x	
Dicranophorus epicharis			x			x	
Dicranophorus grandis						x	
Euchlanis pyriformis			x			x	
Euchlanis meneta						x	
Hexarthra fennica				x			
Lecane flexilis						x	
Lecane hornemanni	x						
Lecane luna	x	x		x	x	x	
Lecane lunaris	x	x	x	x	x	x	x
Lepidella accuminata						x	
Macrochaetus sp.		x					
Monommata sp.					x		
Mytilina ventralis			x			x	x
Platyais quadricornis				x			
Proales cf. alba						x	
Testudinella mucronata						x	
Trichocerca rattus	x					x	

Appendix 2

Photograph 1: Southerly aerial view of Lake Kereta.

Photograph 2: Aerial view of Lake Spectacle to the southeast.

Photograph 3: Aerial view of Lake Tomarata to the northwest.

Photograph 4: Easterly aerial view of Lake Wainamu.

Photograph 5: Southwesterly aerial view of Lake Ototoa.

Photograph 6: Aerial view of Lake Pupuke looking south towards Takapuna City.