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GOVERNMENT OF WESTERN AUSTRALIA
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Lake McLarty Invertebrate sampling October 2017.
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Introduction

In recent years water levels at Lake McLarty has been decreasing and changes in the lake ecology have been observed. Macroinvertebrates play an important role in the function of the wetland and are an important food source to fish and birds. In 2016 and 2017 the macroinvertebrates in Lake McLarty were monitored and the results are discussed below.

Methods

Heidi Bucktin, Megan Sheehan (DBCA) and volunteers (Teresa, Ian and Terry) sampled invertebrates in Lake McLarty on 18th October 2017.

Samples were collected at two sites within the lake (central shore and south-western edge). At both sites there was a high density of submerged macrophytes present with no open water (bare sediment) areas. Rushes were present at both sites but were at a higher density at the southern site. As the habitats were fairly uniform at the sites, the only habitat type sampled were macrophytes i.e. one 20m sweep from macrophytes (submerged and emergent) from each site along with water chemistry data

Each invertebrate sample was passed through a series of 3 sieves (10mm, 2mm and 0.25 mm mesh) and the contents of each sieve were placed in trays and examined. The aim was to pick at least 200 animals from each sample and to collect representatives of all species present, as per AusRivAS methods (Department of Water 2009). In general, all of the contents of the coarsest sieve were sorted and enough of the smaller sieves to be confident that all species present were recorded.

Invertebrates were identified to family or order level by Melita Pennifold (DBCA).

Results

Water quality

At the time of sampling pH was slightly alkaline at both sites (8.3 at central and 8.12 at southwest) and conductivity was relatively low (2.71 mS/cm and 2.30 mS/cm respectively) with both readings slightly higher at the central site.

In 2017, the lake depth was 11cm deeper than when sampled in 2016 (0.69m compared to 0.58m), the conductivity was slightly lower and pH had decreased (Figure 1).

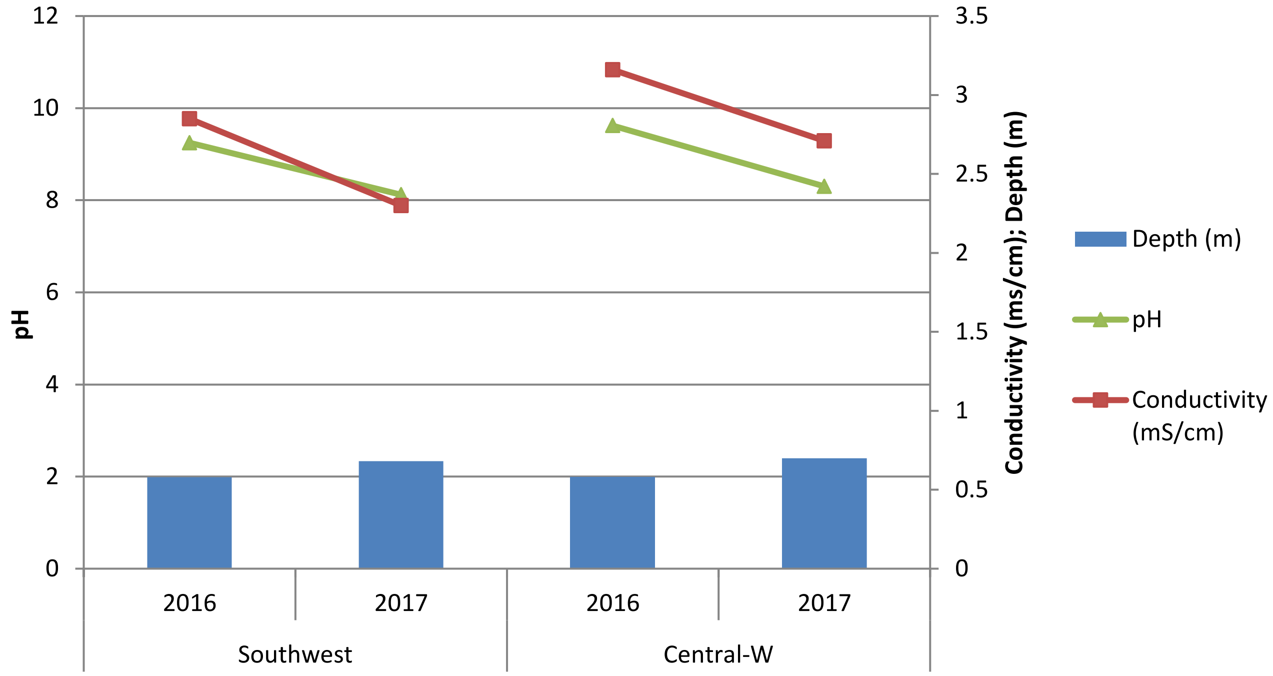

Figure 1. Lake McLarty water chemistry at central and southwest sites at time of invertebrate sampling

<u>Invertebrates</u>

A total of 23 invertebrate family groups were collected in 2017 (Table 1). The most abundant taxa collected from both sites were crustaceans (amphipods, ostracods, copepods, cladocerans). The isopod, *Paramphisopus palustris,* was abundant but was only recorded from the southwest site.

During the 2 years of monitoring (2016-2017), 26 families have been recorded from Lake McLarty. The families Calanoida, Austrocorduliidae (dragonfly) and Hydroptilidae (caddisfly) were only recorded in 2017 and Physidae (mollusc) and Hydrachnidae (water mite) were only recorded in 2016. Only a small number of animals were collected from these families and the annual variation is more likely due to them being missed during sampling rather than changes within the lake.

The sensitivity of each family group to water quality is shown in Table 1 and was determined using the Swan Wetlands Aquatic Macroinvertebrate Pollution Sensitivity (SWAMPS) index (Chessman, Trayler & Davis, 2002) and the sensitivity grade for Australian river macroinvertebrates (SIGNAL 2)(Chessman, 2003). SWAMPS was developed as a biotic index for wetlands near Perth to determine the extent to which macroinvertebrates communities have been disrupted by human intervention. The grades are from 100 (sensitive) to one (most tolerant). The SWAMPS-Family score for Lake McLarty was around 48 in both 2016 1nd 2017, indicating that cultural eutrophication or other human impact is likely to be occurring.

Table 1. Number of individuals collected from the invertebrate sweeps in October 2017. Water quality sensitivity of taxa are shown by Signal 2 score (Chessman, 2003) and SWAMP score (Chessman, Trayler & Davis, 2002).

Class	Order	Family	SWAMP-F	SIGNAL-2	2016		2017		Lake McLarty
					southwest	central-w	southwest	central-w	
					no. indiv	no. indiv	no. indiv	no. indiv	no. indiv
Arachnida	Acariformes	Limnocharidae	78	6	6	1	1	1	9
Arachnida	Acariformes	Eylaidae	53	6	3		7	14	24
Arachnida	Acariformes	Limnesiidae	38	6	9		1	1	11
Arachnida	Acariformes	Hydrachnidae	1	6				1	1
Crustacea	Cladocera	Daphniidae	29		25	25	12	15	77
Crustacea	Cladocera	Chydoridae	43		25	25	12	15	77
Crustacea	Ostracoda	Ostracoda	34		50	34	30	25	139
Crustacea	Copepoda	Calanoida	51		12				12
Crustacea	Copepoda	Cyclopoida	29		15	10	25	25	75
Crustacea	Amphipoda	Ceinidae	41	2	48	53	33	40	174
Crustacea	Isopoda	Amphisopodidae	34	1	7		40		47
Gastropoda	Basommatophora	Physidae	38	1				5	5
Insecta	Coleoptera	Haliplidae	60	2	1		1	5	7
Insecta	Coleoptera	Dytiscidae	49	2	9	6	18	13	46
Insecta	Coleoptera	Hydrophilidae	55	2	17	31	4	10	62
Insecta	Diptera	Culicidae	66	1	5	31		3	39
Insecta	Diptera	Stratiomyidae	58	2		5		2	7
Insecta	Diptera	Ephydridae	60	2	1	8	1		10
Insecta	Diptera	Chironomidae	43	3	38	29	5	9	81
Insecta	Hemiptera	Corixidae	20	2	2	8		1	11
Insecta	Hemiptera	Notonectidae	39	1	19	16	12	17	64
Insecta	Odonata	Lestidae	50	1	13	1	20	10	44
Insecta	Odonata	Aeshnidae	58	4	2	2	.	8	12
Insecta	Odonata	Austrocorduliidae	61	10		1			1
Insecta	Trichoptera	Hydroptilidae	66	4	1				1
Insecta	Trichoptera	Leptoceridae	47	6	17	4	1	2	24
Family Richness					**22**	**18**	**17**	**21**	**26**
SWAMP-F score					**47**	**48**	**48**	**48**	**48**

Table 2. Macroinvertebrates families recorded from Lake McLarty, Lake Mealup and Little Lake Mealup in October 2017.

Class	Order	Family	Lake McLarty	Little Lake Mealup	Lake Mealup
Oligochaeta					*
Arachnida	Acariformes	Limnocharidae	*		
Arachnida	Acariformes	Eylaidae	*		
Arachnida	Acariformes	Limnesiidae	*		
Arachnida	Acariformes	Hydrachnidae	*		
Crustacea	Cladocera	Daphniidae	*		
Crustacea	Cladocera	Chydoridae	*		
Crustacea	Ostracoda	Ostracoda	*		*
Crustacea	Copepoda	Calanoida		*	*
Crustacea	Copepoda	Cyclopoida	*		*
Crustacea	Amphipoda	Ceinidae	*		*
Crustacea	Isopoda	Amphisopodidae	*		*
Gastropoda	Basommatophora	Physidae	*	*	*
Gastropoda	Basommatophora	Ancylidae		*	*
Insecta	Coleoptera	Haliplidae	*		
Insecta	Coleoptera	Dytiscidae	*		*
Insecta	Coleoptera	Hydrophilidae	*	*	
Insecta	Diptera	Cereratopgnidae			
Insecta	Diptera	Culicidae	*		
Insecta	Diptera	Stratiomyidae	*		
Insecta	Diptera	Ephydridae	*	*	
Insecta	Diptera	Chironomidae	*		*
Insecta	Diptera	Muscidae		*	
Insecta	Hemiptera	Corixidae	*	*	
Insecta	Hemiptera	Notonectidae	*	*	
Insecta	Odonata	Lestidae	*		*
Insecta	Odonata	Aeshnidae	*		
Insecta	Odonata	Austrocorduliidae			
Insecta	Odonata	Hemicorduliidae		*	*
Insecta	Trichoptera	Hydroptilidae			
Insecta	Trichoptera	Leptoceridae	*	*	*
Family Richness			**23**	**10**	**13**

Discussion

There were no significant differences in water quality when the lakes were sampled for invertebrates between 2016 and 2017 at Lake McLarty. As water levels were higher in 2017, a slightly lower conductivity was expected, however a decrease in pH may be indicative of the lake bed drying for a longer time over summer and acid sulphate soils being exposed to air, resulting in increasing acidity of the lake on re-flooding. There have been several signs of this occurring with low pH (~3.5) recorded within lake bed cracks and iron staining occurring on the surface (see Muirden 2017 Lake McLarty Hydrology report). To determine if acidification is a threat to this wetland (as has occurred at nearby Lake Mealup) further monitoring is required.

Aquatic invertebrate richness at the lake was similar in both 2016 and 2017, with only rarer animals not being recorded between years, which likely due to them being missed during sampling rather than changes in the lake community. The most abundant taxa collected from both sites (central and south-west) were crustaceans (amphipods, ostracods, copepods, cladocerans). Isopods were abundant but were only recorded from the southwest site in both 2016 and 2017.

In 2017 Lake McLarty had a high family richness (24 families) compared to nearby Lake Mealup (13 families) and Little Lake Mealup (10 families) (Table 2). Lake McLarty has a higher diversity of water mites (Arachnida) than the other lakes and a higher diversity of crustaceans than Little Lake Mealup and more odonates (dragonflies) and hemipterans (boatmen and backswimmers) than Lake Mealup. Having a higher diversity of invertebrates means Lake McLarty can support a variety of bird species (e.g. sandpipers feeding on midges and other dipterans on the sand flats or ducks feeding on snails and crustaceans in macroalgae and rushes (Davis, 2000).

An invertebrate of regional significance collected at Lake McLarty is the isopod *Paramphisopus palustris. P. palustris,* is restricted to the Perth region and is often abundant in the groundwater-fed wetlands of the Swan Coastal Plain. Gouws & Stewart (2007) identified it at risk from groundwater decline, given its poor dispersal capacity, dependence on aestivation and high genetic diversity within the region. Stratchan et al (2014) found *P.* palustris used the damp deep fissures in the lake bed to survive throughout the dry summer months and supported the proposition that *P.* palustris depends on connections to the groundwater and is likely to be negatively affected by further regional drying.

Conclusion.

Lake McLarty has a high diversity of aquatic invertebrates in comparison to nearby Lake Mealup and Little Lake Mealup. There has been no changes in invertebrate family richness however if the lake continues to dry for extended periods, acidification may become a threat to this lake and acid-sensitive species, like crustaceans and molluscs (which are important for bird feeding), may reduce in number. It is recommended that monitoring of macroinvertebrates continues to determine if any future changes to the ecosystem are affecting the aquatic communities.

References

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