

**Ecological responses to
variable water regimes in arid zone wetlands:
Coongie Lakes, Australia^A**

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^A Dedicated to the memory of our friend and colleague, Jim Puckridge.

Abstract

In dryland rivers, interactions between flow variability and complex geomorphology expose floodplain wetlands to long-term patterns of flooding and drying and highly variable short-term events. We consider whether the abundance and diversity of fish, macroinvertebrate and zooplankton communities in wetlands of the Coongie Lakes complex are influenced by long-term water regimes. To relate biological changes to changes in water regime, mean values of assemblage indices were ranked and correlated against ranked frequency of drying (i.e. water retention) in each waterbody. As water retention time increased, fish species diversity (richness, evenness) and disease incidence rose, and fish species dominance and macroinvertebrate abundance decreased. The more mobile species of fish utilise the habitats and food resources provided by newly-flooded waterbodies. We conclude that fish populations utilise wetlands with a variety of water regimes and reductions in the frequency of inundation will decrease fish diversity with sequential losses of less mobile species.

List of taxa observed in this study

The taxa sampled by the various gears (see Table 1 of Puckridge *et al.* 2010) are described in this Accessory Publication. In most of the tables the mean abundance of each taxa per waterbody are described. The codes used for each waterbody, and the location of the waterbody, are described further in Figure 1 of Puckridge *et al.* (2010).

Table 1 describes the zooplankton taxa collected using the 60- μm trawl. Table 2 describes the macroinvertebrate (and including microcrustacean) taxa collected in the 500- μm trawl and the mean abundance of each taxa per waterbody. Table 3 describes the species list of all fish collected in the study and the codes used to describe each species in the subsequent tables. Table 4 describes the mean abundance per waterbody of all taxa of fish larvae and juveniles caught in the 500- μm trawl gear. Table 5 describes the mean abundance per waterbody of all larval and juvenile fish taxa in the shallow littoral caught in the 2-m seine gear. Table 6 describes the mean abundance per waterbody of all juvenile and adult small fish taxa in the deep littoral caught in the 20-m seine gear. Table 7 describes the mean abundance per waterbody of all juvenile and adult large fish taxa in the deep littoral caught in the fyke net gear. Table 8 describes the mean abundance per waterbody of all juvenile and adult large fish taxa in open water caught in the gill net gear.

Table 1. Zooplankton taxa collected using a 60- μ m trawl.

Phylum	Class	Order/Suborder
Protozoa	Mastigophora	
Cnidaria		Hydrozoa
Platyhelminthes	Turbellaria	
Rotifera		
Nematoda		
Tardigrada		
Annelida	Oligochaeta	
Arthropoda	Crustacea	Copepoda Cladocera Ostracoda Conchostraca
	Insecta	Diptera Odonata Collembola
Arthropoda	Arachnida	Hydracarina

Table 2. Macroinvertebrate and large microcrustacean taxa collected using the 500- μ m trawl in open water.

Waterbody		Cu	Qe	Ti	No	Co	To	Go	Ap	Ma
Class	Order									
	Gastropoda	0.1	0.2	0.2	3.1	0.1	0.6	0.4	0.1	0.0
	Oligochaeta	0.0	0.1	3.4	8.5	0.0	0.0	4.9	0.0	0.0
Crustacea	Cladocera	2302.1	9710.5	2712.2	17146.6	9228.7	32014.3	175232.5	107468.9	37715.3
	Copepoda	25110.3	10967.5	6886.1	15701.3	33947.5	33443.0	144705.5	57580.2	313638.8
	Ostracoda	2.1	19.9	6.9	69.3	6.3	73.8	101.7	46.4	126.8
	Conchostraca	0.1	0.1	0.0	7.2	4.3	0.0	0.0	9.5	0.0
	Notostraca	0.0	0.1	0.0	0.0	0.0	0.0	0.0	4.0	0.0
	Anostraca	1.3	0.6	0.0	0.0	0.0	0.0	0.1	281.7	0.2
	Decapoda	22.6	37.2	354.2	492.4	176.0	224.6	846.4	70.6	110.6
	Insecta	Diptera	0.8	43.8	7.0	8.7	0.4	2.2	439.0	1695.8
	Ephemeroptera	0.0	0.2	0.0	7.3	0.2	0.1	0.0	0.3	0.0
	Odonata	0.0	3.6	0.4	4.9	0.3	0.1	0.3	0.0	0.0
	Hemiptera	36.6	606.5	351.9	250.1	1282.5	2304.6	7916.9	1365.2	16774.8
	Coleoptera	7.2	198.2	0.0	23.8	21.2	70.3	295.8	111.8	106.2
	Trichoptera	0.2	71.2	0.5	33.3	3.8	78.5	39.0	30.9	1.0
	Plecoptera	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Arachnida	Hydracarina	1.7	1.1	0.0	0.3	0.4	2.4	20.1	0.8	3.9

Table 3. Fish species caught in all gears and corresponding code used to describe species in following tables.

Species (common name)	Code
<i>Nematalosa erebi</i> (bony bream)	Nem
<i>Retropinna semoni</i> (Australian smelt)	Ret
<i>Hypseleotris</i> spp. (carp gudgeon)	Hyp
<i>Macquaria</i> sp. B (Lake Eyre golden perch)	Mac
<i>Bidyanus welchi</i> (Welch's grunter)	Bid
<i>Gambusia holbrooki</i> (mosquitofish)	Gam
<i>Melanotaenia splendida tatei</i> (desert rainbow fish)	Mel
<i>Leiopotherapon unicolor</i> (spangled perch)	Lei
<i>Carassius auratus</i> (goldfish)	Car
<i>Porochilus argenteus</i> (silver tandan)	Por
<i>Ambassis</i> sp. (glassfish)	Amb
<i>Neosiluroides cooperensis</i> (Cooper Creek tandan)	Neo C
<i>Neosilurus hyrtlii</i> (Hyrtl's tandan)	Neo H

Table 6. Mean abundance per waterbody of all juvenile and adult small fish taxa in the deep littoral caught in the 20-m seine gear.

	No	Co	To	Go	Ap	Ma
Nem	27.5	25.6	9.3	3.0	16.2	2.5
Ret	0.1	0.2	0.2	0.3	0.5	1.5
Hyp	0.3	0.0	0.0	0.2	0.0	0.0
Gam	0.1	0.0	0.0	0.0	0.0	0.0
Mel	0.8	0.2	0.3	0.2	0.0	0.0
Mac	0.2	0.2	0.0	0.0	0.0	0.1
Bid	0.0	0.1	0.0	0.0	0.0	0.1
Lei	0.0	0.0	0.0	0.0	0.0	0.0
Por	0.0	0.1	0.0	0.0	0.0	0.0
Amb	0.1	0.0	0.0	0.0	0.0	0.0

Table 7. Mean abundance per waterbody of all juvenile and adult large fish taxa in the deep littoral caught in the fyke net gear.

	Cu	Qe	Ti	No	Br	El	Ap	Ma
Nem	547.2	452.5	478.1	492.0	571.8	1316.9	312.3	888.8
Ret	0.3	0.0	0.0	0.0	0.9	0.0	0.0	0.0
Hyp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mel	0.3	2.5	0.0	0.1	0.1	0.2	0.0	0.2
Mac	23.2	14.9	7.0	16.2	33.4	20.1	38.0	5.3
Bid	38.4	28.1	34.0	12.1	46.9	33.5	38.5	0.0
Car	0.1	0.2	0.3	1.1	3.0	3.0	0.8	0.0
Lei	0.9	1.6	3.3	1.3	0.9	1.4	0.6	0.0
Por	0.8	11.1	3.3	1.7	0.3	1.4	0.0	0.5
Neo H	1.1	1.3	6.6	6.1	1.5	0.5	0.0	0.0
Neo C	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sco	8.5	2.1	0.0	0.3	0.0	0.1	0.0	0.0

Table 8. Mean abundance per waterbody of all juvenile and adult large fish taxa in open water caught in the gill net gear.

	Cu	Qe	Ti	No	Br	El	Ac
Nem	1.3	2.2	1.0	2.2	2.1	3.4	1.4
Mel	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Mac	0.6	0.2	0.0	0.7	1.5	0.2	0.4
Bid	1.5	0.5	0.0	0.5	0.6	0.7	0.4
Car	0.0	0.0	0.0	0.0	0.7	0.0	0.0
Lei	0.0	0.1	0.1	0.1	0.1	0.0	0.9
Por	0.0	0.7	0.1	0.3	0.8	0.2	0.0
Neo H	0.0	0.0	0.4	0.8	0.0	0.0	0.0
Neo C	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Sco	0.0	0.0	0.0	0.0	0.4	0.0	0.0