

**Alcorlo & Baltanás. 2013. The trophic ecology of the red swamp crayfish (*Procambarus clarkii*) in Mediterranean aquatic ecosystems: a stable isotope study. *Limnetica*, 32(1): 121-138.**

APPENDIX 1. Biological composition of the communities developed at each sampling site (Site 1.- Brazo del Este, Site 2.- Puente de los Vaqueros, Site 3.- Charco de la Boca). The trophic group classification is based on stomach contents and includes several functional feeding categories.

*Composición de las comunidades biológicas de cada estación de muestreo. (Estación 1.- Brazo del Este., Estación 2.- Puente de los Vaqueros, Estación 3.- Charco de la Boca).*

Order	Family	Species	1	2	3	Trophic group
CLOROPHYTA						
Cladophorales	<i>Cladophoraceae</i>	<i>Cladophora</i> sp.	+	+	+	Primary producer
MONOCOTYLEDONEAE						
Gramineae	<i>Poaceae</i>	<i>Cynodon dactylon</i>		+	+	Primary producer (C4)
Gramineae	<i>Poaceae</i>	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.		+	+	Primary producer (C3)
Superorder Bromeliiflorae; Typhales	<i>Typhaceae</i>	<i>Typha</i> sp	+	+	+	Primary producer (C3)
BRANCHIOPODA						
Anomopoda	<i>Daphniidae</i>	<i>Daphnia magna</i> Straus, 1820		+	+	Filter-feeder
Anomopoda	<i>Eurycercidae</i>	<i>Ephemeropterus margalefi</i> Alonso, 1987			+	Filter-feeder
Anomopoda	<i>Eurycercidae</i>	<i>Leydigia acanthocercoides</i> (S. Fischer, 1854)	+		+	Filter-feeder
Anomopoda	<i>Eurycercidae</i>	<i>Alona costata</i> G.O.Sars, 1862		+		Filter-feeder
Anomopoda	<i>Macrotrichidae</i>	<i>Ilyocryptus sordidus</i> (Liévin, 1848)	+			Filter-feeder
COPEPODA						
Cyclopoida	<i>Cyclopidae</i>	<i>Macrocyclus albidus</i> (Jurine 1820)		+	+	Filter-feeder
Cyclopoida	<i>Cyclopidae</i>	<i>Acanthocyclops americanus</i> (Marsh, 1893)			+	Filter-feeder
Calanoida	<i>Diaptomidae</i>	<i>Eudiaptomus vulgaris</i> (Schmeil, 1896)		+		Filter-feeder
OSTRACODA						
Podocopa	<i>Ilyocyprididae</i>	<i>Ilyocypris gibba</i> (Ramdohr, 1808)	+	+		Detritivore
Podocopa	<i>Cyprididae</i>	<i>Heterocypris exigua</i> (Gauthier & Brehm, 1928)		+		Detritivore
Podocopa	<i>Cyprididae</i>	<i>Plesiocypridopsis newtoni</i> (Brady & Robertson, 1870)		+		Detritivore
Podocopa	<i>Cyprididae</i>	<i>Cypridopsis</i> sp.			+	Detritivore
Podocopa	<i>Cyprididae</i>	<i>Herpetocypris</i> sp.			+	Detritivore
MALACOSTRACA						
Decapoda	<i>Cambaridae</i>	<i>Procambarus clarkii</i> (Girard, 1852)	+	+	+	Omnivore
Decapoda	<i>Palaemonidae</i>	<i>Palaemon serratus</i> (Pennant, 1777)	+	+		Omnivore
GASTROPODA						
<i>sp</i>						
INSECTA						
Ephemeroptera	<i>Caenidae</i>			+		Herbivore
Ephemeroptera	<i>Baetidae</i>	<i>Baetis</i> spp.		+	+	Herbivore
Coleoptera		<i>sp</i>	+			Invertivore
Heteroptera	<i>Notonectidae</i>	<i>Notonecta meridionalis</i> Poisson, 1926			+	Invertivore
Heteroptera	<i>Notonectidae</i>	<i>Anisops debilis</i> Gerstaecker, 1878 ssp. <i>perplexus</i> Poisson, 1929		+	+	Invertivore
Heteroptera	<i>Notonectidae</i>	<i>Anisops sardus</i> Herrich-Schäffer, 1850		+	+	Invertivore
Heteroptera	<i>Corixidae</i>	<i>Sigara scripta</i> (Rambur, 1842)			+	Invertivore
Heteroptera	<i>Corixidae</i>	<i>Sigara lateralis</i> (Leach, 1818)			+	Invertivore
Heteroptera		<i>sp</i>		+		Invertivore
Diptera	<i>Culicidae</i>	<i>Culex hortensis</i> Ficalbi, 1889			+	Detritivore
Diptera	<i>Chironomidae</i>		+	+	+	Detritivore
Odonata-Zygoptera	<i>Coenagrionidae</i>	<i>Ischnura elegans</i> (V.d. Lind, 1820)	+			Invertivore
OSTEICHTHYES						
Atheriniformes	<i>Poeciliidae</i>	<i>Gambusia holbrooki</i> (Agassiz, 1859)	+	+	+	Omnivore
Anguilliformes	<i>Anguillidae</i>	<i>Anguilla anguilla</i> (Linnaeus) 1758	+	+	+	Omnivore
Cypriniformes	<i>Cyprinidae</i>	<i>Cyprinus carpio</i> Linnaeus 1758	+	+	+	Omnivore
Cypriniformes	<i>Cyprinidae</i>	<i>Barbus sclateri</i> (Günther, 1868)		+		Omnivore
Perciformes	<i>Mugilidae</i>	<i>Liza ramada</i> (Risso) 1826	+	+		Omnivore

**APPENDIX 2.** Stable carbon and nitrogen concentrations (mean  $\pm$  S.D.) of the biological compartments of site 1 and their calculated mean trophic levels based on  $\delta^{15}\text{N}$ . *Concentraciones de los isótopos de carbono y nitrógeno (media  $\pm$  D.E.) de los compartimentos biológicos de la estación 1 y sus posiciones tróficas medias calculadas con los valores  $\delta^{15}\text{N}$ .*

Site 1 Trophic species	$\delta^{13}\text{C}$				$\delta^{15}\text{N}$				Trophic Position	
	Range	$\bar{X} \pm$	S.D.	n	Range	$\bar{X} \pm$	S.D.	n		
<b>Primary producers</b>										
Detritus	-25.50 to -16.80	-20.26 $\pm$	2.66	9	5.10 to 8.27	6.54 $\pm$	1.16	9	1.00	
Periphyton	-26.80 to -15.30	-19.30 $\pm$	0.53	8	2.10 to 5.00	3.40 $\pm$	0.53	8	1.00	
Phytoplankton	-34.70 to -23.70	-29.07 $\pm$	3.29	9	4.30 to 7.92	5.85 $\pm$	1.19	9	1.00	
Helophytes ( <i>Typha</i> sp.)	-28.20 to -26.80	-27.54 $\pm$	0.37	9	5.20 to 8.42	7.38 $\pm$	1.05	9	1.00	
<b>Invertebrates</b>										
Copepoda	-34.40 to -31.40	-32.32 $\pm$	1.21	9	5.10 to 6.57	5.73 $\pm$	0.64	9	1.42	
Cladocera	-34.00 to -28.50	-31.13 $\pm$	2.53	6	5.80 to 6.00	5.90 $\pm$	0.10	6	1.47	
Microcrustaceans (All)	-30.62 to -28.67	-29.56 $\pm$	4.10	22	5.40 to 6.57	5.78 $\pm$	0.55	22	1.31	
Diptera	-28.90 to -25.60	-27.27 $\pm$	1.79	6	6.09 to 10.00	7.86 $\pm$	1.95	6	1.39	
Heteroptera	-30.70 to -30.30	-28.73 $\pm$	1.94	6	5.10 to 6.60	12.44 $\pm$	1.01	6	2.73	
<i>Palaemon serratus</i>	-30.3 to -28.00	-29.5 $\pm$	1.3	3	8.7 to 10.17	9.39 $\pm$	0.74	3	1.84	
<i>Procambarus clarkii</i> ( $\leq 7\text{cm}$ )	-29.00 to -27.80	-28.23 $\pm$	0.40	6	6.70 to 8.61	7.57 $\pm$	0.20	6	1.30	
<i>Procambarus clarkii</i> ( $\geq 7\text{cm}$ )	-29.05 to -26.40	-28.11 $\pm$	0.63	15	7.30 to 10.85	8.53 $\pm$	1.18	15	1.58	
<b>Fish</b>										
<i>Liza ramada</i>	-31.10 to -28.53	-29.52 $\pm$	0.93	6	9.00 to 9.60	9.39 $\pm$	0.23	6	1.83	
<i>Cyprinus carpio</i>	-31.61 to -31.47	-31.54 $\pm$	0.07	3	10.65 to 10.74	10.70 $\pm$	0.05	3	2.22	
<i>Gambusia holbrooki</i>	-30.20 to -29.20	-29.84 $\pm$	0.34	6	11.00 to 12.30	11.59 $\pm$	0.47	6	2.48	
<i>Anguilla anguilla</i>	-31.70 to -23.85	-27.47 $\pm$	3.81	6	10.20 to 17.08	13.72 $\pm$	3.60	6	3.11	
Fishes (All)	-30.28 to -28.83	-29.32 $\pm$	2.39	21	10.42 to 12.10	11.44 $\pm$	2.50	21	2.44	

**APPENDIX 3.** Stable carbon and nitrogen concentrations (mean  $\pm$  S.D.) of the biological compartments of site 2 and their calculated mean trophic levels based on  $\delta^{15}\text{N}$ . *Concentraciones de los isótopos de carbono y nitrógeno (media  $\pm$  D.E.) de los compartimentos biológicos de la estación 2 y sus posiciones tróficas medias calculadas con los valores  $\delta^{15}\text{N}$ .*

Site 2 Trophic species	$\delta^{13}\text{C}$				$\delta^{15}\text{N}$				Trophic Position	
	Range	$\bar{X} \pm$	S.D.	n	Range	$\bar{X} \pm$	S.D.	n		
<b>Primary producers</b>										
Detritus	-14.40 to -13.00	-13.4 $\pm$	0.4	9	7.50 to 10.76	9.4 $\pm$	1.2	9	1.00	
Phytoplankton	-31.68 to -23.90	-27.0 $\pm$	2.9	9	6.70 to 20.18	13.4 $\pm$	5.1	9	1.00	
Periphyton	-26.71 to -20.34	-23.5 $\pm$	2.2	9	4.10 to 13.33	8.4 $\pm$	3.2	9	1.00	
Helophytes( <i>Typha</i> sp. & <i>Phragmites australis</i> )	-26.90 to -25.05	-26.2 $\pm$	0.7	9	11.20 to 14.85	13.0 $\pm$	1.3	9	1.00	
<i>Cynodon dactylon</i>	-14.50 to -14.20	-14.4 $\pm$	0.2	3	15.20 to 17.40	16.0 $\pm$	1.2	3	1.00	
<b>Invertebrates</b>										
Copepoda	-32.65 to -28.60	-29.9 $\pm$	1.7	9	10.40 to 13.34	12.10 $\pm$	1.1	9	2.59	
Cladocera	-31.90 to -27.90	-29.7 $\pm$	1.9	6				0		
Microcrustaceans (All)	-31.81 to -28.36	-29.8 $\pm$	1.7	15	3.00 to 13.30	12.1 $\pm$	0.0	15	2.59	
Diptera	-24.00 to -23.20	-23.7 $\pm$	0.4	4	9.60 to 10.30	9.8 $\pm$	0.4	4	1.13	
Heteroptera	-30.20 to -25.00	-28.7 $\pm$	1.9	9	11.49 to 13.74	10.2 $\pm$	1.5	9	1.23	
<i>Palaemon serratus</i>	-23.80 to -23.10	-23.4 $\pm$	0.4	3	13.88 to 14.61	14.4 $\pm$	0.4	3	2.5	
<i>Procambarus clarkii</i> ( $\leq 7\text{cm}$ )	-25.70 to -22.36	-23.3 $\pm$	1.4	9	14.45 to 17.20	15.2 $\pm$	1.1	9	2.72	
<i>Procambarus clarkii</i> ( $\geq 7\text{cm}$ )	-25.25 to -22.68	-24.0 $\pm$	0.7	15	13.11 to 18.60	15.8 $\pm$	2.0	15	2.88	
<b>Fish</b>										
<i>Liza ramada</i>	-24.80 to -21.23	-23.0 $\pm$	1.6	6	12.30 to 12.98	12.6 $\pm$	0.3	6	1.96	
<i>Cyprinus carpio</i>	-24.70 to -24.13	-24.5 $\pm$	0.3	3	15.63 to 15.78	15.7 $\pm$	0.1	3	2.85	
<i>Gambusia holbrooki</i>	-25.90 to -24.50	-24.9 $\pm$	0.5	6	15.75 to 16.70	16.2 $\pm$	0.4	6	3.00	
<i>Barbus sclateri</i>	-26.12 to -26.12	-26.1 $\pm$	0.1	3	16.40 to 16.40	16.4 $\pm$	0.1	3	3.06	
<i>Anguilla anguilla</i>	-27.30 to -25.30	-26.4 $\pm$	1.0	3	17.00 to 17.40	17.2 $\pm$	0.2	3	3.28	
Fishes (All)	-28.20 to -20.07	-24.4 $\pm$	1.9	9	15.22 to 17.00	14.7 $\pm$	2.2	9	2.57	

**APPENDIX 4.** Stable carbon and nitrogen concentrations (mean  $\pm$  S.D.) of the biological compartments of site 3 and their calculated mean trophic levels based on  $\delta^{15}\text{N}$ . *Concentraciones de los isótopos de carbono y nitrógeno (media  $\pm$  D.E.) de los compartimentos biológicos de la estación 3 y sus posiciones tróficas medias calculadas con los valores  $\delta^{15}\text{N}$ .*

Site 3 Trophic species	$\delta^{13}\text{C}$				$\delta^{15}\text{N}$				Trophic Position
	Range	$\bar{X} \pm$	S.D.	n	Range	$\bar{X} \pm$	S.D.	n	
<b>Primary producers</b>									
Detritus	-27.00 to -25.40	-26.27 $\pm$	0.70	9	5.2 to 8.87	6.61 $\pm$	1.42	9	1.00
Phytoplankton	-35.67 to -26.70	-30.44 $\pm$	3.14	9	10.40 to 13.50	11.76 $\pm$	1.01	9	1.00
Periphyton	-28.30 to -22.80	-25.27 $\pm$	1.98	9	10.60 to 14.60	13.00 $\pm$	1.35	9	1.00
Helophytes ( <i>Typha</i> sp. & <i>Phragmites australis</i> )	-30.20 to -22.40	-26.33 $\pm$	2.51	9	9.30 to 12.97	10.89 $\pm$	1.31	9	1.00
<i>Cynodon dactylon</i>	-26.70 to -13.10	-16.22 $\pm$	5.20	6	12.00 to 13.20	12.60 $\pm$	0.49	6	1.00
<b>Invertebrates</b>									
Cladocera	-35.77 to -32.05	-33.92 $\pm$	1.46	8	9.20 to 15.44	11.73 $\pm$	2.50	8	1.39
Copepoda	-31.90 to -25.60	-28.69 $\pm$	2.34	8	13.10 to 15.27	13.94 $\pm$	1.01	8	2.02
Microcrustaceans (All)	-33.48 to -29.56	-31.31 $\pm$	3.29	16	11.48 to 14.92	12.83 $\pm$	2.17	16	1.72
Diptera	-34.10 to -25.25	-28.74 $\pm$	2.85	9	11.00 to 14.44	12.62 $\pm$	1.47	7	2.76
Heteroptera	-32.70 to -27.10	-28.73 $\pm$	1.79	9	8.62 to 12.28	10.18 $\pm$	1.37	9	2.05
Coleoptera	-29.30 to -24.90	-26.95 $\pm$	1.79	7	8.60 to 12.13	9.84 $\pm$	1.16	7	1.95
<i>Procambarus clarkii</i> ( $\leq 3\text{cm}$ )	-23.00 to -22.50	-22.79 $\pm$	0.28	3	12.40 to 12.50	12.46 $\pm$	0.08	3	2.71
<i>Procambarus clarkii</i> ( $\leq 7\text{cm}$ )	-26.40 to -22.29	-23.51 $\pm$	1.67	9	12.44 to 14.20	13.20 $\pm$	0.70	9	2.93
<i>Procambarus clarkii</i> ( $\geq 7\text{cm}$ )	-27.00 to -20.87	-22.93 $\pm$	1.69	15	13.16 to 15.80	13.93 $\pm$	0.67	15	3.15
<b>Fish</b>									
<i>Gambusia holbrooki</i>	-24.00 to -23.37	-23.69 $\pm$	0.32	3	13.44 to 13.83	13.69 $\pm$	0.22	3	3.08
Fishes (All)	-25.60 to -23.37	-24.43 $\pm$	1.04	5	13.44 to 15.40	14.35 $\pm$	0.91	5	3.2