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Supplementary material

Size, growth and mortality of riverine golden perch (*Macquaria ambigua*) across a latitudinal gradient

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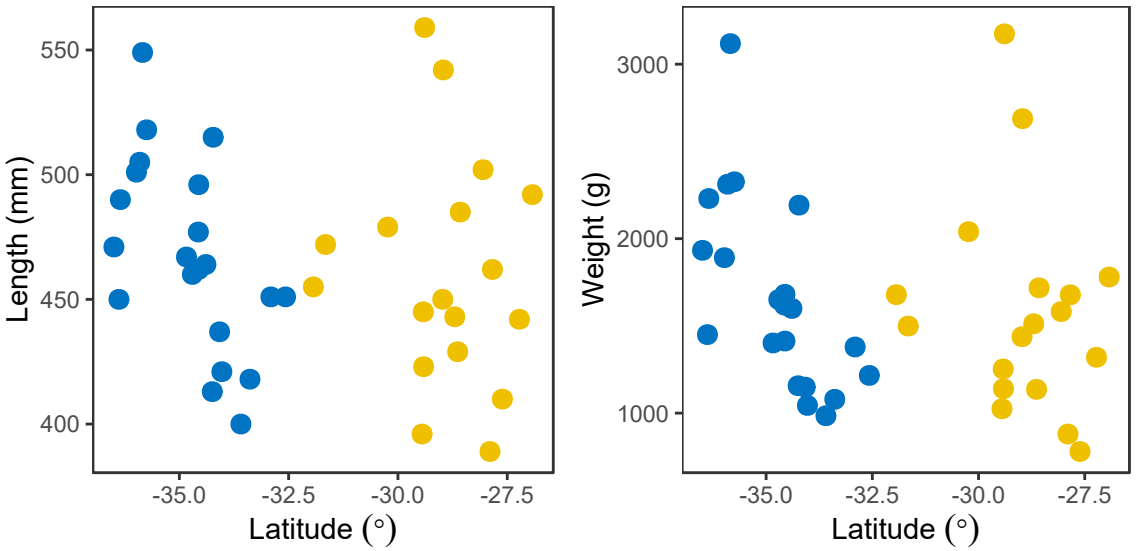

Fig. S1. Maximum length and weight at sampling sites where ≥10 individuals were collected plotted against latitude. Colour denotes data points from the northern (yellow) and southern Murray–Darling Basin (MDB) (blue).

Table S1. Age-at-length probabilities derived from an age–length key (ALK) model for golden perch in the northern Murray–Darling Basin (MDB) region

Shading darkens for higher values and only probabilities >0.001 are presented

Length (mm)	Age (years)													
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+	12+	13+	14+
40	0.945	0.055	0.001												
60	0.844	0.153	0.003												
80	0.629	0.356	0.014	0.001											
100	0.344	0.609	0.044	0.003											
120	0.136	0.754	0.099	0.01	0.001										
140	0.043	0.749	0.177	0.027	0.003										
160	0.012	0.643	0.276	0.061	0.007			0.001							
180	0.003	0.481	0.374	0.122	0.015	0.001	0.001	0.002	0.001						
200	0.001	0.31	0.436	0.209	0.03	0.004	0.003	0.004	0.003						
220		0.172	0.438	0.308	0.049	0.009	0.007	0.008	0.008						
240		0.083	0.383	0.395	0.07	0.019	0.015	0.016	0.018	0.001					
260		0.036	0.298	0.452	0.089	0.035	0.026	0.028	0.033	0.003		0.001			
280		0.014	0.209	0.466	0.102	0.058	0.042	0.043	0.057	0.005	0.001	0.001	0.001		
300		0.005	0.134	0.438	0.107	0.088	0.062	0.06	0.088	0.01	0.002	0.003	0.002	0.001	
320		0.002	0.078	0.376	0.103	0.122	0.083	0.077	0.125	0.016	0.005	0.006	0.004	0.002	
340			0.042	0.297	0.09	0.154	0.103	0.09	0.163	0.026	0.011	0.011	0.008	0.005	
360			0.021	0.215	0.073	0.179	0.117	0.098	0.195	0.037	0.024	0.017	0.015	0.009	0.001
380			0.009	0.144	0.055	0.192	0.123	0.097	0.216	0.05	0.046	0.026	0.024	0.015	0.003
400			0.004	0.089	0.038	0.191	0.119	0.09	0.221	0.061	0.084	0.037	0.035	0.023	0.008
420			0.002	0.051	0.024	0.175	0.107	0.077	0.208	0.069	0.139	0.048	0.048	0.032	0.021
440			0.001	0.026	0.014	0.146	0.087	0.059	0.178	0.072	0.21	0.056	0.06	0.041	0.051
460				0.012	0.007	0.108	0.063	0.041	0.136	0.066	0.283	0.059	0.067	0.048	0.11
480				0.005	0.003	0.071	0.04	0.025	0.092	0.054	0.336	0.054	0.065	0.048	0.207
500				0.002	0.001	0.04	0.022	0.013	0.054	0.038	0.347	0.044	0.056	0.043	0.34
520				0.001		0.02	0.011	0.006	0.028	0.023	0.315	0.031	0.042	0.033	0.491
540						0.009	0.005	0.003	0.013	0.013	0.255	0.019	0.028	0.023	0.633

Table S2. Age-at-length probabilities derived from an age–length key (ALK) model for golden perch in the southern Murray–Darling Basin (MDB) region

Shading darkens for higher values and only probabilities >0.001 are presented

Length (mm)	Age (years)													
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+	12+	13+	14+
40	0.961	0.039													
60	0.543	0.457													
80	0.054	0.946													
100	0.003	0.997													
120		0.999	0.001												
140		0.996	0.004												
160		0.982	0.018												
180		0.914	0.083	0.002	0.001										
200		0.675	0.303	0.013	0.007		0.001	0.002							
220		0.28	0.625	0.047	0.03	0.003	0.005	0.01							
240		0.063	0.704	0.096	0.075	0.01	0.018	0.033	0.001						
260		0.01	0.569	0.14	0.133	0.024	0.043	0.078	0.004						
280		0.001	0.365	0.162	0.189	0.045	0.081	0.145	0.011	0.001					
300			0.189	0.153	0.217	0.069	0.123	0.219	0.027	0.002					
320			0.082	0.12	0.209	0.09	0.158	0.278	0.055	0.004		0.001			
340			0.032	0.084	0.178	0.103	0.179	0.311	0.1	0.008	0.001	0.002		0.001	0.002
360			0.011	0.053	0.137	0.106	0.183	0.315	0.163	0.016	0.003	0.004	0.002	0.002	0.006
380			0.003	0.03	0.095	0.099	0.17	0.289	0.242	0.027	0.009	0.009	0.005	0.004	0.017
400			0.001	0.015	0.059	0.083	0.14	0.236	0.32	0.042	0.02	0.017	0.014	0.007	0.045
420				0.007	0.032	0.06	0.1	0.167	0.365	0.055	0.04	0.027	0.032	0.012	0.103
440				0.002	0.014	0.036	0.06	0.098	0.348	0.06	0.067	0.037	0.064	0.016	0.197
460				0.001	0.005	0.018	0.029	0.048	0.275	0.055	0.093	0.042	0.104	0.017	0.313
480					0.002	0.008	0.012	0.02	0.184	0.043	0.109	0.04	0.145	0.016	0.421
500						0.003	0.005	0.007	0.11	0.029	0.114	0.034	0.179	0.014	0.505
520						0.001	0.002	0.003	0.061	0.019	0.11	0.026	0.206	0.01	0.562
540							0.001	0.001	0.032	0.011	0.102	0.02	0.227	0.008	0.598

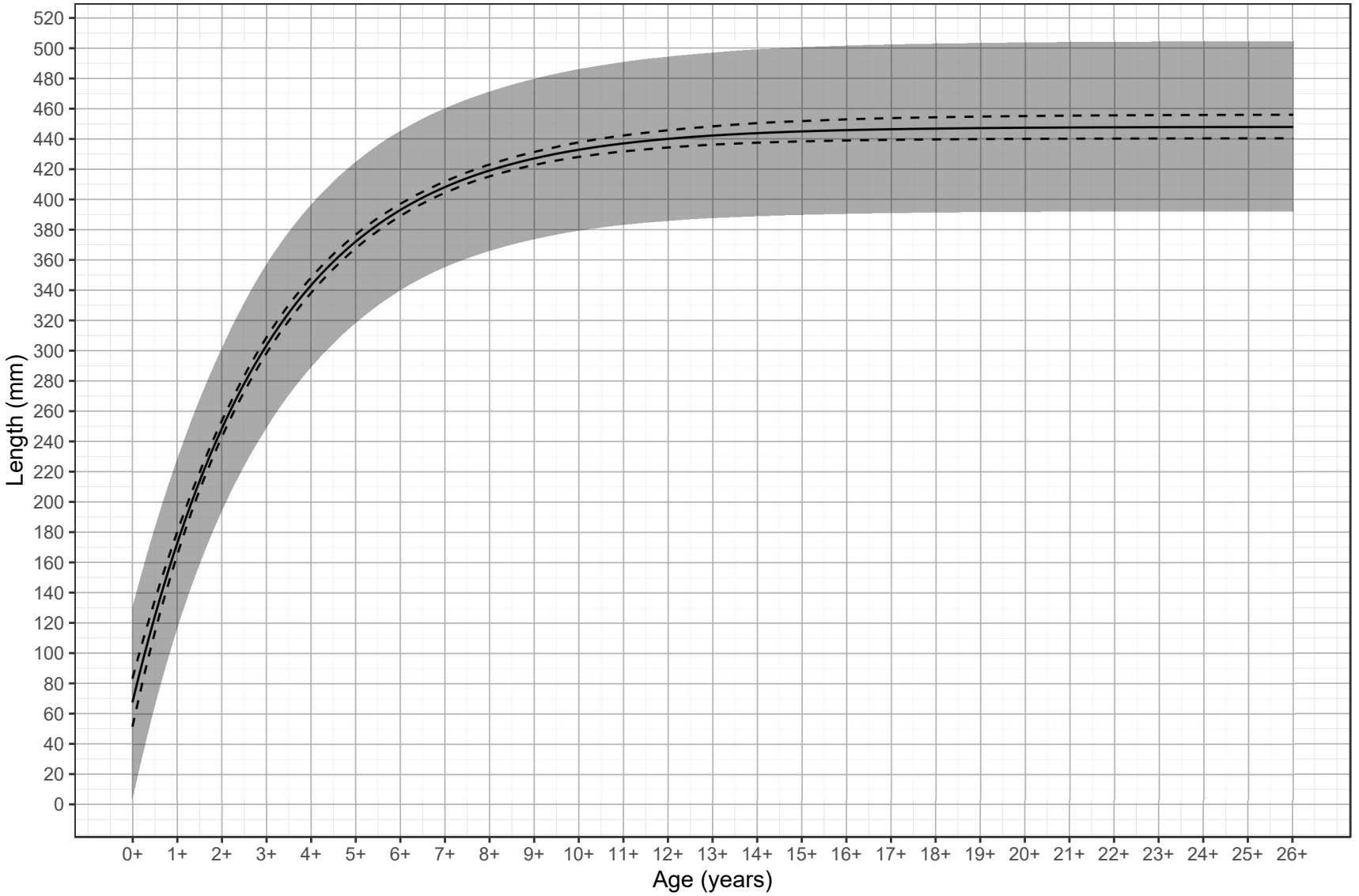

Fig. S2. Golden perch von Bertalanffy growth models (VBGMs) for the entire Murray–Darling Basin (MDB). The dashed line represents 95% bootstrap confidence interval (for the lower interval $E[L|t] = 440\ (1 - e^{-0.35\ (t\ -\ -0.67)}$ and for the upper interval $E[L|t] = 456\ (1 - e^{-0.30\ (t\ -\ -0.34)})$ and the shading indicates 95% bootstrap prediction interval (for the lower interval $E[L|t] = 392\ (1 - e^{-0.34\ (t\ -\ -0.04)}$ and for the upper interval $E[L|t] = 504\ (1 - e^{-0..31\ (t\ -\ -0.96)})$. The solid line indicates the VBGM and is calculated using $E[L|t] = 447\ (1 - e^{-0.32\ (t\ -\ -0.51)})$.

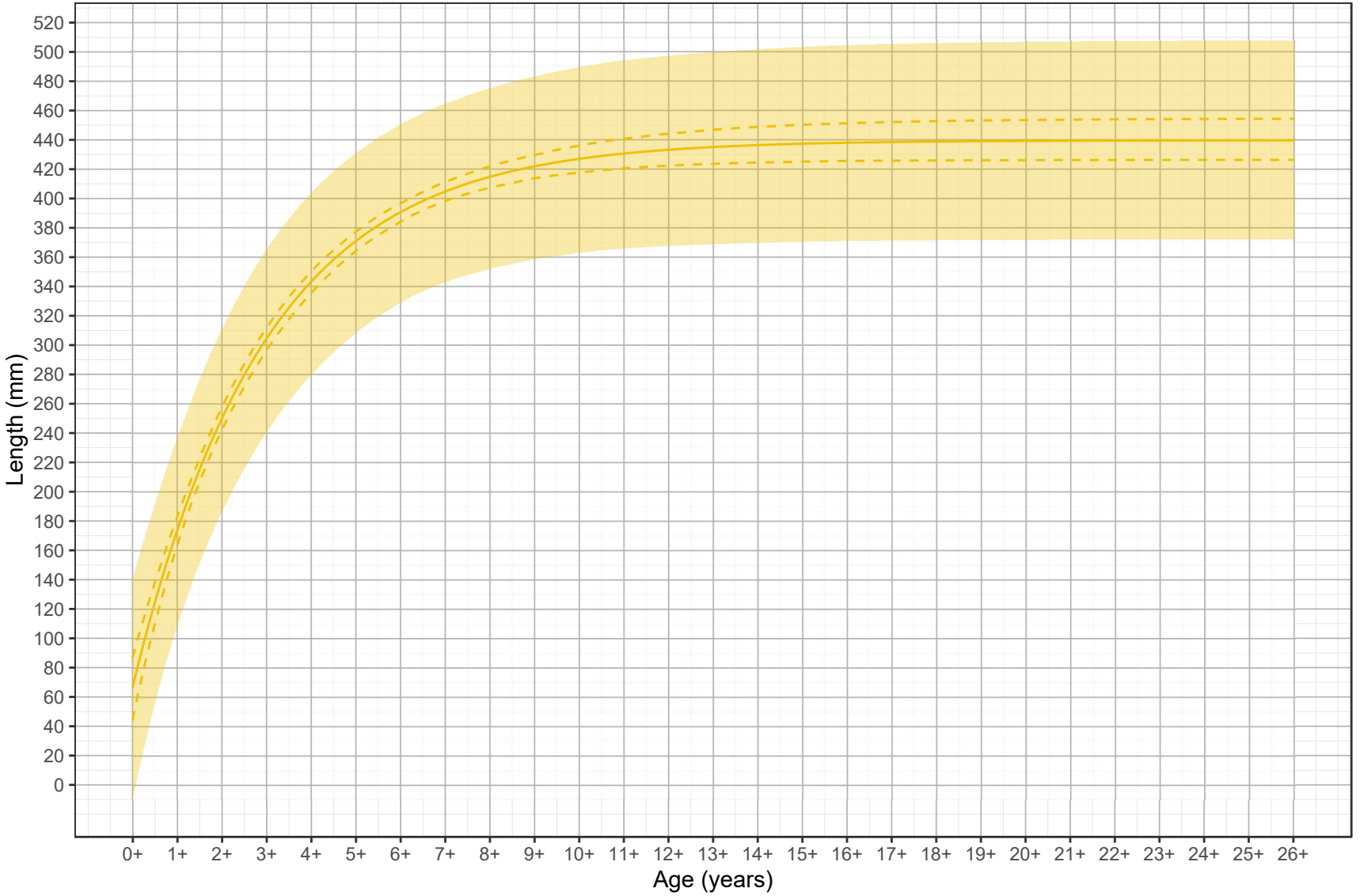

Fig. S3. Golden perch von Bertalanffy growth models (VBGMs) in the northern Murray–Darling Basin (MDB) region. The dashed line represents 95% bootstrap confidence interval (for the lower interval $E[L|t] = 415\ (1 - e^{-0.40\ (t\ -\ -0.61)}$ and for the upper interval $E[L|t] = 442\ (1 - e^{-0.31\ (t\ -\ -0.29)})$ and the shading indicates 95% bootstrap prediction interval (for the lower interval $E[L|t] = 372\ (1 - e^{-0.36\ (t\ -\ 0.06)}$ and for the upper interval $E[L|t] = 506\ (1 - e^{-0.31\ (t\ -\ -1.03)})$. The solid line indicates the VBGM and is calculated using $E[L|t] = 439\ (1 - e^{-0.34\ (t\ -\ -0.49)})$.

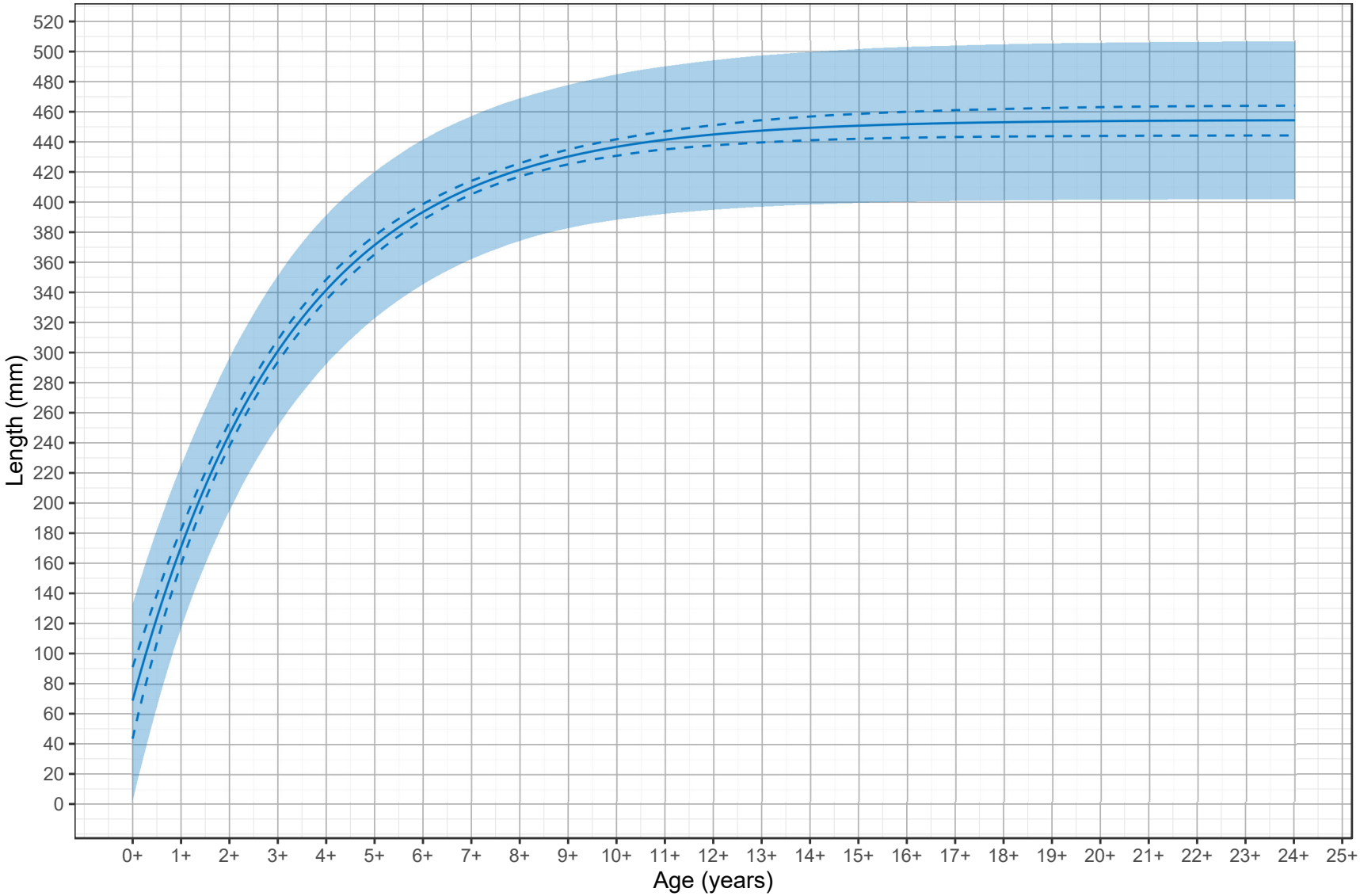

Fig. S4. Golden perch von Bertalanffy growth models (VBGMs) in the southern Murray–Darling Basin (MDB) region. The dashed line represents 95% bootstrap confidence interval (for the lower interval $E[L|t] = 445\ (1 - e^{-0.35\ (t\ -\ -0.80)}$ and for the upper interval $E[L|t] = 465\ (1 - e^{-0.27\ (t\ -\ -0.32)}$) and the shading indicates 95% bootstrap prediction interval (for the lower interval $E[L|t] = 403\ (1 - e^{-0.32\ (t\ -\ -0.04)}$ and for the upper interval $E[L|t] = 506\ (1 - e^{-0..29\ (t\ -\ -1.04)}$). The solid line indicates the VBGM and is calculated using $E[L|t] = 447\ (1 - e^{-0.32\ (t\ -\ -0.51)}$).

Table S3. Sampled locations, year ranges, sample sizes, length and age ranges, and von Bertalanffy growth model (VBGM) coefficients (L_∞, K and t_0) for golden perch reported in current and past studies

Coefficient errors or ranges between upper and lower 95% confidence intervals are provided in parentheses. Asterisks refer to values inferred from a figure within Mallen-Cooper and Stuart (2003)

Sampled locations	Years	Sample size (n)	TL (mm)	Age (years)	L_∞ (mm)	K (year^{-1})	t_0 (years)	Study
Southern Murray–Darling Basin rivers (Broken, Campaspe, Loddon, Murray, Murrumbidgee and Wimmera), lakes (Burrinjuck, Cullulleraine, Green, Middle, Moira, Nagambie), reservoirs (Googong), floodplains (Barwah Forest) and wetlands (Tahbilk Lagoon)	1984–1991	796	86–600	0–16	501 (± 10)	0.46 (± 0.04)	0.44 (± 0.11)	Anderson (1992)
Southern river (Murray)	1990–1992	216	80–470*	1–12*	418 (± 17)	0.57 (± 0.10)	0.67 (± 0.22)	Mallen- Cooper and Stuart (2003)
Southern river (Murrumbidgee)	Not reported	95	50–550*	1–26*	502 (± 10)	0.45 (± 0.04)	0.87 (± 0.13)	
Northern river (Darling)	Not reported	39	130–520*	1–10*	354 (± 17)	0.56 (± 0.15)	0.33 (± 0.27)	
Southern river (Murray)	2009–2013	582	211–582	2–27	528	0.14	–4.22	Forbes *et al*. (2015)
Southern river (Murrumbidgee)	2009–2013	540	108–540	0–17	463	0.37	–0.53	
Murray–Darling Basin rivers (Barwon-Macintyre, Condamine, Balonne, Border, Gwydir, Macquarie, Darling, Moonie, Campaspe, Goulburn, Loddon, Murray and Murrumbidgee)	2017–2018	873	52–559	0–26	447 (440– 456)	0.32 (0.30– 0.35)	–0.51 (–0.67 – –0.34)	This study

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