10.1071/MF23167

Marine and Freshwater Research

Supplementary Material

The suitability of a dynamic coastal lake to support the diadromous fish *Galaxias maculatus*

Christopher G. Meijer[A,*], *Michael J. H. Hickford*[B], *Duncan P. Gray*[C], *and David R. Schiel*[A]

[A]School of Biological Sciences, University of Canterbury–Te Whare Wānanga o Waitaha, Christchurch, New Zealand.

[B]National Institute of Water and Atmospheric Research, Christchurch, New Zealand.

[C]Environment Canterbury, Christchurch, New Zealand.

[*]Correspondence to: Christopher G. Meijer School of Biological Sciences, University of Canterbury–Te Whare Wānanga o Waitaha, Christchurch, New Zealand Email: meijerch13@gmail.com

Table S1. Summary of sampling for īnanga across all road-accessible tributaries following the opening on 21 September 2021.

Tributary (distance from lake outlet)	Day 0 (20 Sep)	Day 4 (24 Sep)	Day 7 (27 Sep)	Day 10 (30 Sep)	Day 14 (4 Oct)
Waikēkēwai (1 km)	0	22	12	18	7
Harts (9 km)	0	13	6	4	7
Drain Road (11 km)	0	4	2	1	3
Boggy (12 km)	0	16	22	11	6
Selwyn (19.5 km)	0	0	3	20	11
LII (22 km)	0	0	16	20	44
Halswell (30 km)	0	0	4	12	8
Kaituna (36 km)	0	0	13	18	53

Distances from lake outlet were estimated assuming the īnanga would travel along the western lake margin, instead of travelling directly across the lake. The 'Day 0' sampling was done on the first day of the successful opening (20 September) to assess if īnanga from the previous opening were still present in the lower reaches of any tributaries (most recent opening event ended ~3 weeks earlier).

Table S2. Summary of recapture sampling for stained īnanga following the opening on 20 September 2022.

Stain	Tributary (distance from lake outlet)	After 24 h		After 48 h		After 72 h		After 96 h	
Neutral Red	Waikēkēwai (1 km)	2	58	12	284	1	183	-	233
	Harts (9 km)	0	28	2	175	1	84	-	18
	Drain Road (11 km)	0	237	0	48	1	13	-	6
	Boggy (12 km)	0	0	0	32	2	28	-	35
Bismarck brown	Waikēkēwai (1 km)	6	284	8	183	2	233	-	195
	Harts (9 km)	1	175	5	84	1	18	-	77
	Drain Road (11 km)	0	48	1	13	1	6	-	14
	Boggy (12 km)	0	32	1	28	2	35	-	22

Distances from lake outlet were estimated assuming the īnanga would travel along the lake margin. All catch data are presented as the number stained followed by the total number caught in that tributary for that 24-h period. Note that staining was done over 2 days, with neutral red used ~24 h before bismarck brown, so the total catches are offset by 24 h to reflect this.

Table S3. Cumulative mortality for the three groups of īnanga housed in aerated buckets of lake water in the laboratory for 96 h after staining during the September 2022 opening.

Stain	Mortality after 24 h	Mortality after 48 h	Mortality after 72 h	Mortality after 96 h	Number remaining
Control (no stain)	0	0	0	0	20
Neutral Red	0	3	4	5	15
Bismarck brown	0	0	2	2	18

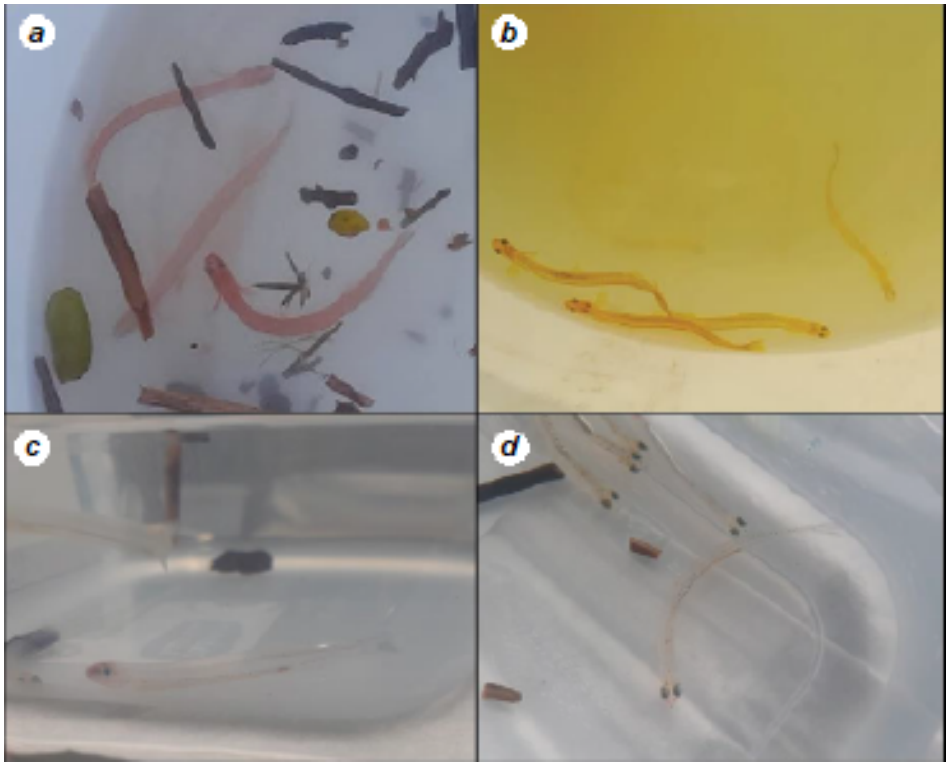

Fig. S1. Comparison of neutral red (left) and bismarck brown (right) stains used on īnanga post-larvae. Although vibrantly coloured immediately after staining (*a*–*b*), only faint traces were left after 72 h (***c***–***d***).

Fig. S2. Some of the sets of artificial spawning habitats used for assessments of īnanga spawning success in (*a*) Boggy Creek in March 2021, and (*b*) Waikēkēwai Creek, (*c*) Boggy Creek and (*d*) Barrys Bay Stream in March 2022.

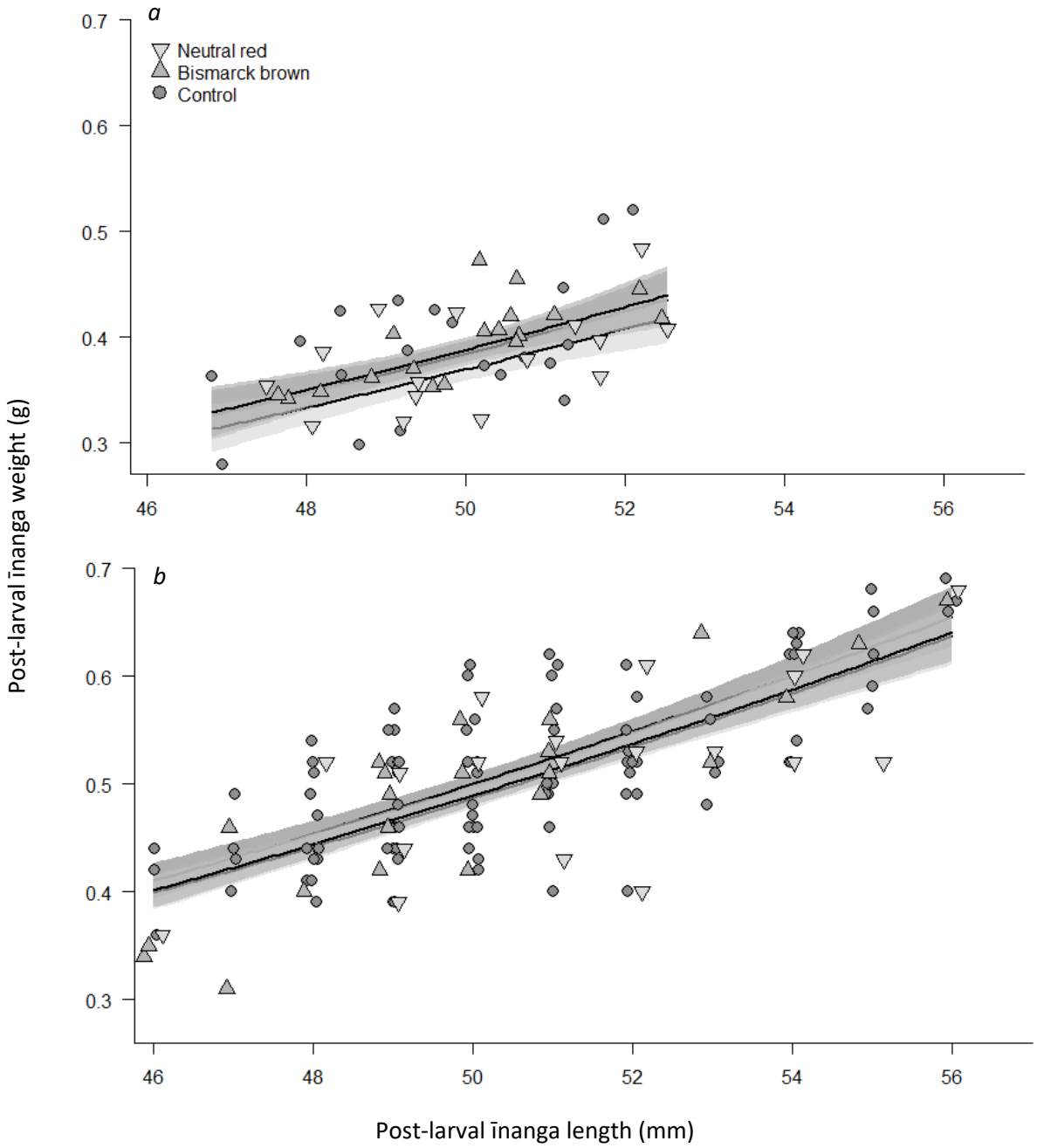

Fig. S3. Model predictions and 95% confidence intervals for īnanga length–weight relationships when stained using neutral red or bismarck brown. These īnanga were either (*a*) housed in the laboratory or (*b*) caught in the field. Each point represents a single fish. Note that field-caught īnanga post-larvae were measured to the nearest millimetre, but the points in B have been jittered to minimise overlap.