

TABLE S3 | List of functional traits found in the studies reviewed and the classification of each trait.

N	Functional traits	Type of trait	Category	Number of articles
1	Absolute relative fecundities	Ecological	Life history	1
2	Adult food	Ecological	Feeding	1
3	Affinity for water turbidity	Ecological	Habitat use	1
4	Age at 1st reproduction	Ecological	Life history	1
5	Age at female maturity	Ecological	Life history	4
6	Age at maturation	Ecological	Life history	11
7	Air-breathing capability	Ecological	Physiology	2
8	Anal fin height	Morphological	Locomotion	6
9	Anal fin length	Morphological	Locomotion	6
10	Aspect ratio of the caudal fin	Morphological	Locomotion	9
11	Aspect ratio of the pectoral fin	Morphological	Locomotion	13
12	Barbel maximum length	Morphological	Feeding	6
13	Biomass	Morphological	Feeding	15
14	Body area	Morphological	Habitat use	8
15	Body compression	Morphological	Habitat use	3
16	Body depth at the position of the eye	Morphological	Habitat use	1
17	Body depth	Morphological	Habitat use	30
18	Body depth at the insertion of the pectoral fin	Morphological	Habitat use	8
19	Body depth at the origin of the dorsal fin	Morphological	Habitat use	1
20	Body depth below midline	Morphological	Habitat use	4
21	Body elongation	Morphological	Habitat use	3
22	Body height	Morphological	Habitat use	6
23	Body height at the pectoral fin insertion	Morphological	Habitat use	1
24	Body high	Morphological	Habitat use	1
25	Body lateral shape	Morphological	Habitat use	2
26	Body length/size	Morphological	Habitat use	9
27	Body length to body depth ratio	Morphological	Habitat use	2
28	Body length to caudal-peduncle length ratio	Morphological	Habitat use	1
29	Body shape	Morphological	Habitat use	21
30	Body shape ratio	Morphological	Habitat use	1
31	Body transversal shape	Morphological	Habitat use	7
32	Body transversal surface	Morphological	Locomotion	6
33	Body width	Morphological	Locomotion	24
34	Caudal fin area	Morphological	Locomotion	4
35	Caudal fin aspect ratio	Morphological	Locomotion	3
36	Caudal fin depth	Morphological	Locomotion	24
37	Caudal fin length	Morphological	Locomotion	11
38	Caudal fin shape	Morphological	Locomotion	3
39	Caudal peduncle compression index	Morphological	Locomotion	4
40	Caudal peduncle depth	Morphological	Locomotion	25
41	Caudal peduncle dimensions	Morphological	Locomotion	1
42	Caudal peduncle height	Morphological	Locomotion	4
43	Caudal peduncle length	Morphological	Locomotion	18
44	Caudal peduncle width	Morphological	Locomotion	12
45	Caudal fin surface	Morphological	Locomotion	9
46	Caudal peduncle length to body length ratio	Morphological	Locomotion	1
47	Caudal peduncle throttling	Morphological	Locomotion	13
48	Climate adaptation	Ecological	Habitat use	1
49	Clutch size	Ecological	Life history	2
50	Colour brightness	Morphological	Feeding	1
51	Compression index	Ecological	Habitat use	6
52	Cross-sectional morphology	Morphological	Habitat use	1
53	Depression index of the ventral region	Morphological	Habitat use	3



TABLE S2 | (Continued)

N	Functional traits	Type of trait	Category	Number of articles
54	Depth of the eye midline	Morphological	Habitat use	1
55	Descendant per reproductive cycles	Ecological	Life history	2
56	Diet	Ecological	Feeding	17
57	Diet breadth	Ecological	Feeding	3
58	Distance from pectoral-fin insertion to the bottom of the body	Morphological	Habitat use	7
59	Distance from the center of the eye to the bottom of the head	Morphological	Habitat use	8
60	Distance from the tip of the upper jaw to the bottom of the head along the head depth axis	Morphological	Habitat use	1
61	Distance from the top of the mouth to the bottom of the head along the head depth axis	Morphological	Habitat use	8
62	Dorsal fin area	Morphological	Locomotion	2
63	Dorsal fin height	Morphological	Locomotion	6
64	Dorsal fin length	Morphological	Locomotion	7
65	Egg diameter	Morphological	Life history	8
66	Egg incubation	Ecological	Life history	1
67	Egg type	Ecological	Life history	2
68	Embryo development	Morphological	Life history	1
69	Eye diameter	Morphological	Feeding	43
70	Eye diameter to head length ratio	Morphological	Feeding	1
71	Eye height	Morphological	Feeding	4
72	Eye position	Morphological	Feeding	28
73	Eye size	Morphological	Feeding	7
74	Eye vertical position	Morphological	Feeding	2
75	Eye ventral distance	Morphological	Feeding	1
76	Fecundity	Ecological	Life history	15
77	Feeding depth	Ecological	Feeding	1
78	Feeding habitat	Ecological	Feeding	7
79	Feeding tactics/behavior	Ecological	Feeding	3
80	Female maturity	Ecological	Life history	3
81	Fineness coefficient	Morphological	Locomotion	5
82	Fins area	Morphological	Locomotion	1
83	Fins surface ratio	Morphological	Locomotion	10
84	Fins surface to body size ratio	Morphological	Habitat use	5
85	Fleshy lip thickness	Ecological	Habitat use	1
86	Foraging method	Ecological	Feeding	2
87	Foraging period/behavior	Ecological	Feeding	3
88	Fork length	Morphological	Habitat use	1
89	Gill raker	Morphological	Feeding	2
90	Gill raker depth	Morphological	Feeding	2
91	Gill raker length	Morphological	Feeding	9
92	Gill raker number	Morphological	Feeding	1
93	Gill-raker shape	Morphological	Feeding	2
94	Gregariousness referred to the adults	Ecological	Life history	2
95	Growth rate	Ecological	Life history	4
96	Gut length	Morphological	Feeding	14
97	Habitat preference/use	Ecological	Habitat use	12
98	Head depth	Morphological	Feeding	18
99	Head depth along the vertical axis of the eye	Morphological	Feeding	5
100	Head height	Morphological	Feeding	5
101	Head high	Morphological	Feeding	1
102	Head length	Morphological	Feeding	19
103	Head length to eye diameter ratio	Morphological	Feeding	1
104	Head size	Morphological	Feeding	1
105	Hypoxia tolerance	Ecological	Physiology	7



TABLE S2 | (Continued)

N	Functional traits	Type of trait	Category	Number of articles
106	Incubation period	Ecological	Life history	3
107	Index of ventral flattening	Morphological	Habitat use	4
108	Internal fertilization	Ecological	Life history	7
109	Inter-raker distance	Morphological	Feeding	1
110	Intestinal diameter	Morphological	Feeding	2
111	Jaw protrusion	Morphological	Feeding	1
112	Larval length	Morphological	Life history	1
113	Length at maturation	Morphological	Life history	7
114	Life history strategy	Ecological	Life history	4
115	Life span	Ecological	Life history	8
116	Living habitat	Ecological	Habitat use	3
117	Longevity	Ecological	Life history	16
118	Longitudinal distribution	Ecological	Habitat use	1
119	Lower tooth row angle	Morphological	Feeding	1
120	Lower tooth row length	Morphological	Feeding	1
121	Mandibular protractibility	Morphological	Feeding	2
122	Maturation	Ecological	Life history	3
123	Maxillary jaw length	Morphological	Feeding	5
124	Maximum age	Ecological	Life history	2
125	Maximum standard length	Morphological	Life history	35
126	Maximum tolerated temperature	Ecological	Physiology	2
127	Maximum total length	Morphological	Life history	34
128	Microhabitat use	Ecological	Habitat use	5
129	Middle line height	Morphological	Habitat use	5
130	Migration	Ecological	Life history	30
131	Minimum tolerated temperature	Ecological	Physiology	2
132	Mouth depth	Morphological	Feeding	7
133	Mouth gape shape	Morphological	Feeding	1
134	Mouth height	Morphological	Feeding	2
135	Mouth opening-ventral side distance	Morphological	Feeding	1
136	Mouth position	Morphological	Feeding	31
137	Mouth protrusion	Morphological	Feeding	3
138	Mouth protrusion length	Morphological	Feeding	2
139	Mouth width	Morphological	Feeding	15
140	Number of egg	Ecological	Life history	1
141	Number of lower teeth	Morphological	Feeding	1
142	Number of pyloric caeca	Morphological	Feeding	1
143	Number of spawning events	Ecological	Life history	1
144	Number of teeth	Morphological	Feeding	2
145	Number of upper teeth	Morphological	Feeding	1
146	Offspring survival	Ecological	Life history	1
147	Oral disk length	Morphological	Feeding	1
148	Oral disk width	Morphological	Feeding	1
149	Oral gap height	Morphological	Feeding	1
150	Oral gape	Morphological	Feeding	8
151	Oral-gape position	Morphological	Feeding	12
152	Oral-gape shape	Morphological	Feeding	10
153	Oral-gape surface	Morphological	Feeding	7
154	Overall tolerance guilds	Ecological	Physiology	1
155	Parental care	Ecological	Life history	29
156	Pectoral fin area	Morphological	Locomotion	18
157	Pectoral fin height	Morphological	Locomotion	3
158	Pectoral fin insertion	Morphological	Locomotion	1



TABLE S2 | (Continued)

N	Functional traits	Type of trait	Category	Number of articles
159	Pectoral fin length	Morphological	Locomotion	29
160	Pectoral fin position	Morphological	Locomotion	20
161	Pectoral fin shape	Morphological	Locomotion	3
162	Pectoral fin size	Morphological	Locomotion	3
163	Pectoral fin width	Morphological	Locomotion	3
164	Pelvic fin length	Morphological	Locomotion	6
165	Physiological sensitivity	Ecological	Physiology	1
166	Presence of barbels	Morphological	Feeding	4
167	Presence of jaw teeth	Morphological	Feeding	1
168	Presence of oral teeth	Morphological	Feeding	1
169	Presence of scales	Morphological	Habitat use	2
170	Presence of spine	Morphological	Habitat use	1
171	Protrusion length	Morphological	Feeding	4
172	Relative area of dorsal fin	Morphological	Locomotion	1
173	Relative area of pectoral fin	Morphological	Locomotion	8
174	Relative area of the anal fin	Morphological	Locomotion	1
175	Relative area of the caudal fin	Morphological	Locomotion	3
176	Relative area of the pelvic fin	Morphological	Locomotion	1
177	Relative body height	Morphological	Habitat use	2
178	Relative body length	Morphological	Habitat use	1
179	Relative caudal peduncle depth	Morphological	Locomotion	1
180	Relative caudal peduncle length	Morphological	Locomotion	7
181	Relative depth	Morphological	Habitat use	9
182	Relative eye position	Morphological	Feeding	4
183	Relative eye size	Morphological	Feeding	6
184	Relative fecundities	Ecological	Life history	4
185	Relative fin surface	Morphological	Locomotion	1
186	Relative gut length	Morphological	Feeding	1
187	Relative head depth	Morphological	Feeding	3
188	Relative head height	Morphological	Feeding	2
189	Relative head high	Morphological	Feeding	1
190	Relative head length	Morphological	Feeding	7
191	Relative head width	Morphological	Feeding	1
192	Relative height of caudal peduncle	Morphological	Locomotion	2
193	Relative maxillary length	Morphological	Feeding	1
194	Relative mouth height	Morphological	Feeding	2
195	Relative mouth vertical position	Morphological	Feeding	1
196	Relative mouth width	Morphological	Feeding	5
197	Relative pectoral fin length	Morphological	Locomotion	2
198	Relative pectoral fin position	Morphological	Locomotion	1
199	Relative snout length	Morphological	Feeding	2
200	Relative width of caudal peduncle	Morphological	Locomotion	3
201	Reproduction mode	Ecological	Life history	3
202	Reproductive guild	Ecological	Life history	11
203	Reproductive strategy	Ecological	Life history	3
204	Reproductive habitat	Ecological	Life history	8
205	Resilience	Ecological	Life history	1
206	Rheophily	Ecological	Habitat use	5
207	Salinity	Ecological	Physiology	2
208	Shape factors	Morphological	Locomotion	2
209	Snout length	Morphological	Feeding	12
210	Snout protrusion	Morphological	Feeding	4
211	Spawning	Ecological	Life history	2



TABLE S2 | (Continued)

N	Functional traits	Type of trait	Category	Number of articles
212	Spawning frequency	Ecological	Life history	2
213	Spawning size	Ecological	Life history	1
214	Spawning substrate	Ecological	Life history	6
215	Spawning temperature	Ecological	Life history	1
216	Spawning time/season	Ecological	Life history	5
217	Spawning type	Ecological	Life history	3
218	Spawning water depth	Ecological	Life history	1
219	Stomach diameter	Morphological	Feeding	1
220	Stomach length	Morphological	Feeding	4
221	Substrate preference	Ecological	Habitat use	12
222	Swimming factors	Morphological	Locomotion	8
223	Swimming types	Morphological	Locomotion	1
224	Temperature preferences	Ecological	Physiology	6
225	Temperature range	Ecological	Physiology	2
226	Tolerance to environmental perturbation/habitat degradation	Ecological	Physiology	1
227	Tooth length lower	Morphological	Feeding	1
228	Tooth length upper	Morphological	Feeding	1
229	Tooth shape	Morphological	Feeding	5
230	Tooth thickness	Morphological	Feeding	1
231	Total fecundity	Ecological	Life history	2
232	Trophic breadth	Ecological	Feeding	2
233	Trophic guild	Ecological	Feeding	44
234	Trophic level/position	Ecological	Feeding	8
235	Upper tooth row angle	Morphological	Feeding	1
236	Upper tooth row length	Morphological	Feeding	1
237	Velocity preference/ fluvial dependence	Ecological	Habitat use	14
238	Ventral fin area	Morphological	Locomotion	1
239	Vertical position/water column position	Ecological	Habitat use	33
240	Vulnerability	Ecological	Life history	1



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