

**TABLE S2** | List of the 115 articles included in our review on temporary pools fish, with abbreviated authors and year of publication.

N	Article title	Authors	Year
1	Morphological and genetic analysis of a rediscovered <i>Clinostomum</i> sp. parasitising <i>Titanolebias monstrosus</i> and <i>Trigonectes aplocheilooides</i> (Cyprinodontiformes: Rivulidae)	Montes <i>et al.</i>	2024
2	Yellow grub diseases on two seasonal killifish (Cyprinodontiformes, Rivulidae): a histopathological study	Cesare <i>et al.</i>	2024
3	Morphofunctional analysis of the gastrointestinal tract of an annual killifish: In search of structural traits related to the annual life history	Domínguez-Castanedo <i>et al.</i>	2024
4	Validation of qPCR reference genes in the endangered annual killifish <i>Austrolebias charrua</i> considering different tissues, gender and environmental conditions	Pagano <i>et al.</i>	2024
5	River drainage rearrangements and the phylogeographic pattern of the annual fish <i>Austrolebias arachan</i> (Cyprinodontiformes, Rivulidae)	Loureiro <i>et al.</i>	2024
6	Assessment of oxidative stress biomarkers in the threatened annual killifish <i>Austrolebias charrua</i> exposed to Roundup	Pagano <i>et al.</i>	2024
7	Redescription of <i>Austrolebias accorsii</i> (Cyprinodontiformes: Rivulidae) and description of a new species of the genus from the upper Paraguay River basin	Drawert, Ergueta	2024
8	Egg production of annual fish <i>Austrolebias cyaneus</i> and <i>Cynopoecilus nigrovittatus</i> occurs throughout their entire life cycle to survive in a temporary wetland	Weber <i>et al.</i>	2023
9	From the mud to the tree: phylogeny of <i>Austrolebias</i> killifishes, new generic structure and description of a new species (Cyprinodontiformes: Rivulidae)	Alonso <i>et al.</i>	2023
10	A new species of cloud fish of the genus <i>Hypselebias</i> from Northeast Brazil (Cyprinodontiformes: Rivulidae)	Ramos <i>et al.</i>	2023
11	A preliminary approach to embryonic development of <i>Austrolebias wolterstorffi</i> , an endangered neotropical annual fish species	Weber <i>et al.</i>	2023
12	Environmental risks of a commonly used pyrethroid: Insights from temporary pond species of the Lake Manyara Basin, Tanzania	Kafula <i>et al.</i>	2023
13	Trophic niche partitioning between <i>Austrofundulus guajira</i> and <i>Rachovia hummelincki</i> (Cyprinodontiformes: Rivulidae) in temporary wetlands in northern Colombia	Pacheco <i>et al.</i>	2023
14	Effects of temperature and heat waves on embryonic development of annual fishes from Neotropical wetlands: Implications for climate change scenarios	Godoy <i>et al.</i>	2023
15	Molecular delimitation of the seasonal killifishes of the <i>Hypselebias antenori</i> species group (Cyprinodontiformes, Rivulidae), with description of two new species from the Caatinga coastal basins, northeastern Brazil	Abrantes <i>et al.</i>	2023
16	Cryptic stasis during the development of <i>Nothobranchius furzeri</i> suggests new stages of dormancy outside of the typical three diapauses of annual killifishes	Polačík, Vrtilek	2023
17	How maternal age and environmental cues influence embryonic developmental pathways and diapause dynamics in a North American annual killifish	Domínguez-Castanedo <i>et al.</i>	2022
18	RNAseq analysis of brain aging in wild specimens of short-lived turquoise killifish: commonalities and differences with aging under laboratory conditions	Mazzetto <i>et al.</i>	2022
19	Genome of the rio Pearlfish ( <i>Nematolebias whitei</i> ), a bi-annual killifish model for Eco-Evo-Devo in extreme environments	Thompson <i>et al.</i>	2022
20	Pesticide sensitivity of <i>Nothobranchius neumanni</i> , a temporary pond predator with a non-generic life-history	Kafula <i>et al.</i>	2022
21	Feeding ecology and coexistence dynamics in a community of fishes in a temperate temporary water body	Tessy <i>et al.</i>	2022



**TABLE S2 I** (Continued)

N	Article title	Authors	Year
22	Hotspots of annual fish along the Patos-Mirim Lagoon System and adjacent areas in Southern Brazil, with an evaluation of conservation priority for species and localities	Garcez <i>et al.</i>	2022
23	Protogynous functional hermaphroditism in the North American annual killifish, <i>Millerichthys robustus</i>	Domínguez-Castanedo <i>et al.</i>	2022
24	Recognizing the enemy: do predator cues influence hatching in Neotropical annual killifish?	Godoy <i>et al.</i>	2021
25	Stress promotes reproduction in the annual fish <i>Austrolebias reicherti</i>	Passos <i>et al.</i>	2021
26	Biomarkers of oxidative stress in the post-embryonic characterization of the neotropical annual killifish	Castro <i>et al.</i>	2021
27	Embryonic developmental arrest in the annual killifish <i>Austrolebias charrua</i> : a proteomic approach to diapause III	Chalar <i>et al.</i>	2021
28	Association of androgens and estrogens with agonistic behavior in the annual fish <i>Austrolebias reicherti</i>	Reyes <i>et al.</i>	2021
29	Embryo ecology: developmental synchrony and asynchrony in the embryonic development of wild annual fish populations	Polačik <i>et al.</i>	2021
30	Two new annual fishes (Cyprinodontiformes: Rivulidae) unexpectedly discovered in the highlands of southern Brazil	Lanés <i>et al.</i>	2021
31	Using stable 813C and 815N isotopes to assess foodweb structures in an African subtropical temporary pool	Necker <i>et al.</i>	2020
32	Evidences for genetic differentiation within the highly endemic and endangered annual fish <i>Austrolebias nigrofasciatus</i> (Cyprinodontiformes: Rivulidae)	Barbosa <i>et al.</i>	2020
33	Phylogenetic structure of Neotropical annual fish of the genus <i>Cynopoecilus</i> (Cyprinodontiformes: Rivulidae), with an assessment of taxonomic implications	Garcez <i>et al.</i>	2020
34	Chromosomal markers are useful to species identification in Rivulidae (Cyprinodontiformes, Alopcheiloidei), including the resolution of taxonomic uncertainties in a vulnerable species complex	Dutra <i>et al.</i>	2020
35	Geographic distribution and conservation of seasonal killifishes (Cyprinodontiformes, Rivulidae) from the mid-northeastern caatinga ecoregion, northeastern Brazil	Abrantes <i>et al.</i>	2020
36	Reproductive biology of the African lungfish <i>Protopterus annectens annectens</i> (Owen, 1839) in the Mono River Basin of Benin, West Africa	Lederoun <i>et al.</i>	2020
37	Oxidative stress resistance in a short-lived Neotropical annual killifish	Godoy <i>et al.</i>	2020
38	Genetic diversity of a widespread annual killifish from coastal Tanzania	Bartáková <i>et al.</i>	2020
39	Effects of the presence of annual killifish on the assemblage structure of resting stages of aquatic invertebrates in temporary ponds	Vendramin <i>et al.</i>	2020
40	Rapid growth and large body size in annual fish populations are compromised by density-dependent regulation	Vrtílek <i>et al.</i>	2019
41	Transcriptome-based SNP discovery and validation in the hybrid zone of the Neotropical annual fish genus <i>Austrolebias</i>	García <i>et al.</i>	2019
42	<i>Austrolebias ephemerus</i> (Cyprinodontiformes: Rivulidae), a new annual fish from the upper Rio Paraguai basin, Brazilian Chaco	Volcan, Severo-Neto	2019
43	Age-associated liver alterations in wild populations of <i>Austrolebias minuano</i> , a short-lived Neotropical annual killifish	Godoy <i>et al.</i>	2019
44	Body size and population dynamics of annual fishes from temporary wetlands in Southern Brazil	Volcan <i>et al.</i>	2019



TABLE S2 I (Continued)

N	Article title	Authors	Year
45	Changing patterns of growth in a changing planet: how a shift in phenology affects critical life-history traits in annual fishes	García <i>et al.</i>	2019
46	Breeders age affects reproductive success in <i>Nothobranchius furzeri</i>	Api <i>et al.</i>	2018
47	Females of the annual killifish <i>Austrolebias reichertii</i> (Cyprinodontiformes: Rivulidae) recognize conspecific mates based upon chemical cues	Blegini <i>et al.</i>	2018
48	Local variation in embryo development rate in annual fish	Polačík <i>et al.</i>	2018
49	The genome of <i>Austrofundulus limnaeus</i> offers insights into extreme vertebrate stress tolerance and embryonic development	Wagner <i>et al.</i>	2018
50	First record of an annual endemic fish from a semiarid environment in northeastern Brazil	Oliveira <i>et al.</i>	2018
51	Review of the family Rivulidae (Cyprinodontiformes, Aplocheiloidei) and a molecular and morphological phylogeny of the annual fish genus <i>Austrolebias</i> Costa 1998	Loureiro <i>et al.</i>	2018
52	Squeezing out the last egg - annual fish increase reproductive efforts in response to a predation threat	Grégoir <i>et al.</i>	2018
53	Extremely rapid maturation of a wild African annual fish	Vrtílek <i>et al.</i>	2018
54	Phenology of three coexisting annual fish species: seasonal patterns in hatching dates	García <i>et al.</i>	2018
55	Phylogeography of the critically endangered neotropical annual fish, <i>Austrolebias wolterstorffi</i> (Cyprinodontiformes: Aplocheilidae): genetic and morphometric evidence of a new species complex	Garcez <i>et al.</i>	2018
56	Community assembly in <i>Nothobranchius</i> annual fishes: nested patterns, environmental niche and biogeographic history	Reichard <i>et al.</i>	2017
57	Costly defense in a fluctuating environment-sensitivity of annual <i>Nothobranchius</i> fishes to predator kairomones	Polačík, Janáč	2017
58	Molecular phylogeny and timing of diversification in South American Cynolebiini seasonal killifishes	Costa <i>et al.</i>	2017
59	Life history strategies of annual killifish <i>Millerichthys robustus</i> (Cyprinodontiformes: Cynolebiidae) in a seasonally ephemeral water body in Veracruz, México	Domínguez-Castanedo <i>et al.</i>	2017
60	Strategies to avoid the trap: stream fish use fine-scale hydrological cues to move between the stream channel and temporary pools	Espírito-Santo <i>et al.</i>	2017
61	Inferring evolution of habitat usage and body size in endangered, seasonal Cynopoeciline killifishes from the South American Atlantic Forest through an integrative approach (Cyprinodontiformes: Rivulidae)	Costa	2016
62	Mitochondrial DNA sequence and lack of response to anoxia in the annual killifish <i>Austrofundulus limnaeus</i>	Wagner <i>et al.</i>	2016
63	Threatened pond endemicity on an oceanic island: the presence of an exotic fish	Florencio, Lamelas-López	2016
64	Female fecundity traits in wild populations of African annual fish: the role of the aridity gradient	Vrtílek, Reichard	2016
65	Description of two new species of annual fishes of the <i>Hypselebias antenori</i> species group (Cyprinodontiformes: Rivulidae), from Northeast Brazil	Britzke <i>et al.</i>	2016
66	Molecular phylogeny and evolution of internal fertilization in South American seasonal Cynopoeciline killifishes	Costa <i>et al.</i>	2016
67	Seasonal dynamics in community structure, abundance, body size and sex ratio in two species of Neotropical annual fishes	Lanés <i>et al.</i>	2016



**TABLE S2 I** (Continued)

N	Article title	Authors	Year
68	The role of deterministic factors and stochasticity on the trophic interactions between birds and fish in temporary floodplain ponds	Keppeler <i>et al.</i>	2016
69	Temporary pools provide stability to fish assemblages in Amazon headwater streams	Espírito-Santo, Zuanon	2016
70	Terrestrial fishes: rivers are barriers to gene flow in annual fishes from the African savanna	Bartáková <i>et al.</i>	2015
71	Adaptation in a variable environment: Phenotypic plasticity and bet-hedging during egg diapause and hatching in an annual killifish	Furness <i>et al.</i>	2015
72	Comparison of captive lifespan, age-associated liver neoplasias and age-dependent gene expression between two annual fish species: <i>Nothobranchius furzeri</i> and <i>Nothobranchius korthausei</i>	Baumgart <i>et al.</i>	2015
73	Gene expression patterns that support novel developmental stress buffering in embryos of the annual killifish <i>Austrofundulus limnaeus</i>	Wagner, Podrabsky	2015
74	Conservation status of an endangered annual fish <i>Hypselebias antenori</i> (Rivulidae) from Northeastern Brazil	Nascimento <i>et al.</i>	2015
75	Highly plastic resource allocation to growth and reproduction in females of an African annual fish	Vrtilek, Reichard	2015
76	The morphology-diet relationship and its role in the coexistence of two species of annual fishes	Keppeler <i>et al.</i>	2015
77	Sex determination in annual fishes: searching for the master sex-determining gene in <i>Austrolebias charrua</i> (Cyprinodontiformes, Rivulidae)	Arezo <i>et al.</i>	2014
78	Abundance variations and life history traits of two sympatric species of Neotropical annual fish (Cyprinodontiformes: Rivulidae) in temporary ponds of southern Brazil	Lanés <i>et al.</i>	2014
79	Reproductive strategies of two Neotropical killifish, <i>Austrolebias vandenbergi</i> and <i>Neofundulus ornatipinnis</i> (Cyprinodontiformes: Rivulidae) in the Bolivian Gran Chaco	Schalk <i>et al.</i>	2014
80	Species limits and DNA barcodes in <i>Nematolebias</i> , a genus of seasonal killifishes threatened with extinction from the Atlantic forest of south-eastern Brazil, with description of a new species (Teleostei: Rivulidae)	Costa <i>et al.</i>	2014
81	Karyotype patterns of <i>Hypselebias antenori</i> (cyprinodontiformes: Rivulidae): an endangered killifish of the semiarid region of Brazil	Nascimento <i>et al.</i>	2014
82	Alternative intrapopulation life-history strategies and their trade-offs in an African annual fish	Polačík <i>et al.</i>	2014
83	The strange case of east African annual fishes: aridification correlates with diversification for a savannah aquatic group?	Dorn <i>et al.</i>	2014
84	Discovery of endangered annual killifish <i>Austrolebias cheradophilus</i> (Apocheiloidei: Rivulidae) in Brazil, with comments on habitat, population structure and conservation status	Lanés <i>et al.</i>	2014
85	Multiple environmental stressors increase the realized niche breadth of a forest-dwelling fish	White <i>et al.</i>	2014
86	Strong population genetic structuring in an annual fish, <i>Nothobranchius furzeri</i> , suggests multiple savannah refugia in southern Mozambique	Bartáková <i>et al.</i>	2013
87	Female annual killifish <i>Austrolebias reicherti</i> (Cyprinodontiformes, Rivulidae) attend to male chemical cues	Passos <i>et al.</i>	2013
88	Spatial distribution of fish assemblages along environmental gradients in the temporary ponds of Northern Pantanal, Brazil	Tondato <i>et al.</i>	2013



TABLE S2 I (Continued)

N	Article title	Authors	Year
89	<i>Spectrolebias brousseauai</i> (Cyprinodontiformes: Rivulidae: Cynolebiatinae), a new annual fish from the upper río Mamoré basin, Bolivia	Nielsen	2013
90	Parallel evolution of senescence in annual fishes in response to extrinsic mortality	Tozzini <i>et al.</i>	2013
91	Reproductive strategies of Amazonian stream fishes and their fine-scale use of habitat are ordered along a hydrological gradient	Espírito-Santo <i>et al.</i>	2013
92	A new species of annual fish, <i>Hypselebias tocantinensis</i> sp.n. (Cyprinodontiformes: Rivulidae) from the río Tocantins basin, northeastern Brazil	Nielsen <i>et al.</i>	2012
93	Age structure of annual <i>Nothobranchius</i> fishes in Mozambique: Is there a hatching synchrony?	Polačik <i>et al.</i>	2011
94	Diet overlap among three sympatric African annual killifish species <i>Nothobranchius</i> spp. from Mozambique	Polačik, Reichard	2010
95	Fish dispersal in a seasonal wetland: Influence of anthropogenic structures	Hohausova <i>et al.</i>	2010
96	The use of annual killifish in the biocontrol of the aquatic stages of mosquitoes in temporary bodies of fresh water; a potential new tool in vector control	Matias, Adriás	2010
97	A new species of <i>Simpsonichthys</i> (Cyprinodontiformes: Rivulidae) from the río São Francisco basin, northeastern Brazil	Nielsen <i>et al.</i>	2010
98	The effect of seasonal variation in abiotic factors on fish community structure in temporary and permanent pools in a tropical wetland	Escalera-Vázquez, Zambrano	2010
99	Diet of four annual killifishes: an intra and interspecific comparison	Laufer <i>et al.</i>	2009
100	<i>Papiliolebias hatinne</i> , a new annual fish species (Cyprinodontiformes: Rivulidae) from Salta, Argentina	Azpelicueta <i>et al.</i>	2009
101	Reproductive behavior in the annual fish <i>Austrolebias reichertii</i> Loureiro & García 2004 (Cyprinodontiformes: Rivulidae)	García <i>et al.</i>	2008
102	Extreme anoxia tolerance in embryos of the annual killifish <i>Austrofundulus limnaeus</i> : insights from a metabolomics analysis	Podrabsky <i>et al.</i>	2007
103	A new species of the genus <i>Nothobranchius</i> (Cyprinodontiformes: Nothobranchiidae) from the coastal area of northeastern Mozambique	Valdesalici	2007
104	An inducible 70 kDa-class heat shock protein is constitutively expressed during early development and diapause in the annual killifish <i>Austrofundulus limnaeus</i>	Podrabsky, Somero	2007
105	Social behavior of pirá-brasilia, <i>Simpsonichthys boitonei</i> Carvalho (Cyprinodontiformes, Rivulidae)	Shibatta	2006
106	Fish assemblages in temporary ponds adjacent to 'terra-firme' streams in Central Amazonia	Pazin <i>et al.</i>	2006
107	Changes in gene expression associated with acclimation to constant temperatures and fluctuating daily temperatures in an annual killifish <i>Austrofundulus limnaeus</i>	Podrabsky, Somero	2004
108	<i>Austrolebias arachan</i> (Cyprinodontiformes, Rivulidae), a new species of annual fish from northeastern Uruguay	Loureiro <i>et al.</i>	2004
109	Changes in prairie stream fish assemblages restricted to isolated streambed pools	Ostrand, Wilde	2004
110	Growth of the annual fish, <i>Cynolebias viarius</i> (Cyprinodontiformes), in the natural habitat compared to laboratory conditions	Errea, Danulat	2001
111	Spatial and temporal variation in fish assemblages of drying stream pools: The role of abiotic and biotic factors	Magoulick	2000



**TABLE S2 I** (Continued)

N	Article title	Authors	Year
112	Larval development of the Salamanderfish, <i>Lepidogalaxias salamandroides</i> Mees (Lepidogalaxiidae)	Gill, Morgan	1999
113	Revision of the neotropical annual fish genus <i>Pituna</i> Costa 1989 (Cyprinodontiformes Rivulidae)	Costa	1998
114	<i>Cynolebias gilbertoi</i> , a new species of annual fish (Cyprinodontiformes: Rivulidae) from the Rio São Francisco basin, northeastern Brazil	Costa	1998
115	Reversible stage-specific embryonic inhibition mediated by the presence of adults in the annual fish <i>Nothobranchius guentheri</i>	Inglima <i>et al.</i>	1981

## Neotropical Ichthyology

OPEN  ACCESS



This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

Distributed under  
Creative Commons CC-BY 4.0

© 2025 The Authors.  
Diversity and Distributions Published by SBI



Official Journal of the  
Sociedade Brasileira de Ictiologia

### HOW TO CITE THIS ARTICLE

- Costa JHA, Zuanon J, Selinger A, Castilho AG, Souza UP, Duarte RF. Diving into temporary pools: a global perspective on freshwater fish research. *Neotrop Ichthyol.* 2025; 23(3):e250043. <https://doi.org/10.1590/1982-0224-2025-0043>