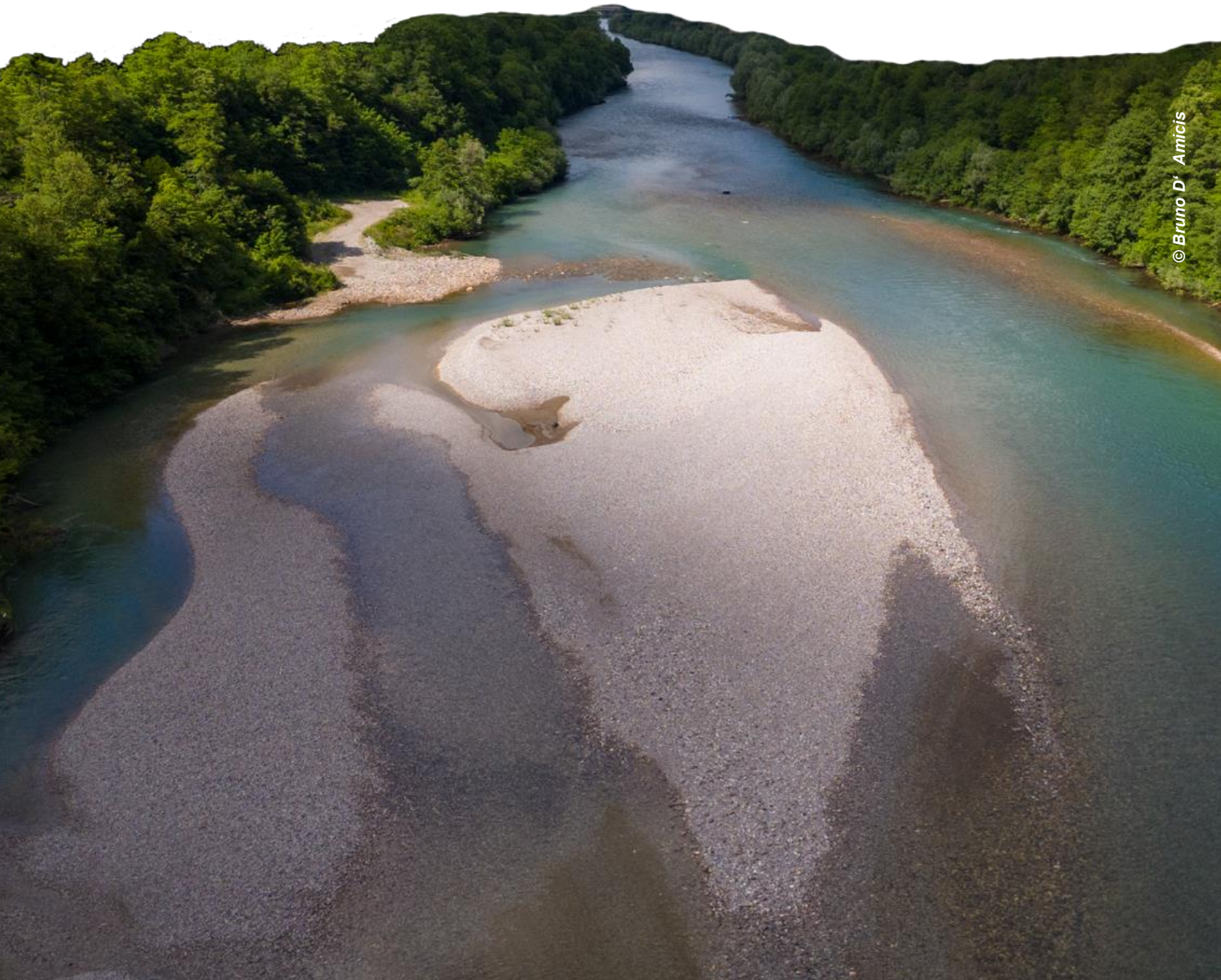
Scientific Position Paper

THE CASE OF THE UPPER DRINA

Ecological integrity as a prerequisite for preserving a unique aquatic core habitat of global significance

Background | Criticism | Recommendations

2025



Key messages

I

The Drina catchment upstream of the Lim River confluence – including its still near-natural tributaries Tara, Sutjeska, and Ćehotina – represents a unique aquatic core habitat within the Danube basin. Preserving the ecological integrity of this unique freshwater system is of utmost importance.

II

The Upper Drina Basin forms an ecologically functional and interconnected river network. The hydrological and biological connectivity of this system is crucial for maintaining aquatic biodiversity and ensuring the long-term viability of sensitive and endangered fish populations, most notably the Danube salmon (*Hucho hucho*).

III

Due to its pristine hydro-morphology and largely undisturbed connectivity, we consider the Upper Drina Basin not only a regional conservation priority, but a centerpiece in promoting the global survival of the Danube salmon.

IV

Any political or financial support for further hydropower development in the Upper Drina River system contradicts the principles of sustainable water management. Such projects cause severe environmental impacts and are likely to have accumulating, long-term negative effects on riverine ecosystems.

V

We, the undersigned members of the scientific community, therefore, call for an immediate halt to all hydropower expansion in the Upper Drina and its tributaries. The construction of additional hydropower plants would cause irreversible damage to the native fish fauna and would likely drive the last wild populations of Danube salmon to extinction.

Background and Motivation

The Upper Drina Basin (hereafter UDB), located in the border region between Bosnia and Herzegovina and Montenegro, encompasses a remarkably complex mosaic of ecosystems, many of which remain in a near-natural state. These relatively undisturbed river stretches represent a unique ecological heritage that warrants strict protection. The basin continues to support numerous species and habitats of exceptional conservation value, recognized at national, regional, and European levels for their contribution to biodiversity (World Bank Group WBIF, 2017).

Current hydropower development requires urgent attention because the ecological significance of the Upper Drina region – both within the UDB and the broader Danube catchment – is being critically underestimated and insufficiently acknowledged. Alone on the UDBs first 50 km, including the tributaries Tara, Sutjeska, and Ćehotina, over 25 new hydropower plants (HPPs) are planned, with three already under construction on the Bistrica River and one long operating on the Piva River. Considering that the first 50 km of the Drina River together with the Tara River (which flows through the UNESCO World Heritage Site of Durmitor National Park) and its headwater tributaries form a 200 km-long, and in many regards pristine river system, which is possibly the least polluted and most intact river system in the entire Danube basin (Weiss et al., 2018), any deterioration must be seen as an enormous and unacceptable threat to Europe's river landscape.

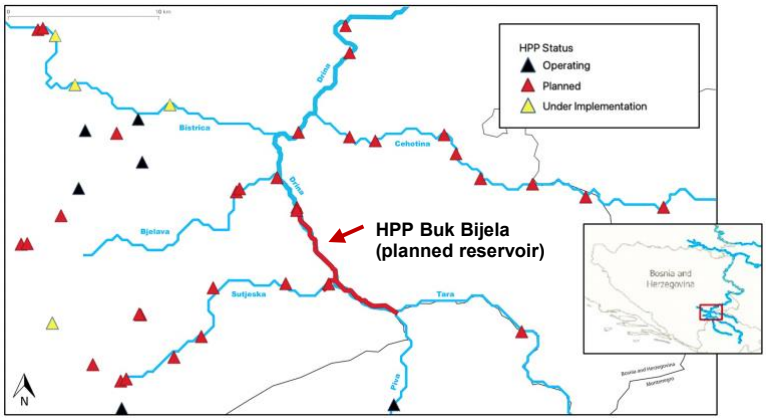


Fig.1. The Upper Drina Basin is under acute threat from extensive hydropower development, with numerous new plants planned or under construction across its mainstem and tributaries (HPP data from Schwarz, 2024).

The proposed development of hydropower in the UDB stands in stark contrast to the knowledge that such interventions would profoundly disrupt the entire riverine ecosystem, including its complex abiotic–biotic interactions and diverse aquatic and semi-aquatic fauna (Freyhof 2015; Weiss et al. 2018; Obradović & Vulević 2023; Pinter & Gruber 2024; He et al. 2024). The construction of dams and the loss of free-flowing rivers are among the primary drivers of population decline in migratory freshwater fish. According to Deinet et al. (2024), more than 40% of European freshwater fish species are threatened. The Living Planet Index further reports that European migratory freshwater fish populations have declined by an average of 75% between 1970 and 2020. These figures represent some of the highest threat levels recorded for any major vertebrate group in Europe (Freyhof & Brooks, 2011). In the light of such devastating developments, the UDB as an exceptional biodiversity hotspot on a continental level should be in the spotlight as one of the last strongholds for riverine ecosystems holding highly threatened species.

Given that a central HPP project in the region — the “Buk Bijela” project with a dam height of 55 m and a reservoir length of more than 11 km — was already flagged for further analyses within the Drina River Basin - Roof Top report (World Bank Group WBIF, 2017), and considering that its last environmental impact assessment in 2012 was rejected (Riverwatch, 2019), it remains highly questionable whether the current evaluation methods adequately reflect the relevant evaluation criteria. Foreseeable irreversible alterations to the riverine regime of the UDB, especially those associated with hydropower development and its well-documented ecological impacts (He et al. 2024), require rigorous scrutiny under the precautionary principle.

The Upper Drina as a recognized Balkan Biodiversity Hotspot

Despite its outstanding ecological value, only about 5% of the Drina River Basin is currently under protection - well below European averages - underscoring the urgent need to preserve remaining intact habitats, including designated Natura 2000 areas (World Bank Group WBIF, 2017). Aquatic biodiversity, in particular, receives limited attention in current protection strategies. It is therefore necessary to emphasize that of the 22 fish species listed for the Upper Drina Basin (Weiss et al. 2018), many are subject to strict conservation requirements: 13 species — including the pigo (*Rutilus pigus*), souffia (*Telestes souffia*), and grayling (*Thymallus thymallus*) — are protected under the Bern Convention and/or the EU Habitats Directive. In addition to the Danube salmon, the pigo and the ecologically important species nase (*Chondrostoma nasus*) are classified as endangered or near threatened by the IUCN. Thus, future management must prioritize the conservation of remaining ecologically intact river sections, including existing and potential Natura 2000 sites (World Bank Group WBIF, 2017; Obradović & Vulević, 2023).

Fig.2. Structural diversity and natural dynamics, as seen here on the Ćehotina River, form the basis for the rich aquatic life of the Upper Drina Basin, including over 20 fish species. The planned construction of 9 hydropower plants would destroy this habitat and eliminate the huchen's core range of at least 25 km.
© Kurt Pinter

The Ecological Integrity of the Upper Drina River System

While the Upper Drina has experienced some downstream hydrological modification due to hydropeaking from a large dam on the lower Piva River, most of its channel and habitat structure – especially in its tributaries – remains remarkably intact (Pinter & Gruber, 2024). This integrity underpins a diverse mosaic of habitat types – spawning grounds, refuge areas, and juvenile development zones – that are essential for the survival of the occurring fish fauna. However, these habitat features are highly vulnerable to alteration through hydropower development (He et al., 2024). Their ecological function depends not only on their presence but on sustained connectivity across both space and time. It is this connectivity – linking habitats longitudinally, laterally, and across seasonal cycles – that enables the full expression of life-history strategies within the aquatic community. Disruption of these linkages through river fragmentation, altered flow- and sediment regimes, as well as the habitat loss due to the construction of reservoirs would fundamentally compromise these processes, destroying the ecological integrity of the entire aquatic assemblage.

The Upper Drina River Basin: A Critical Stronghold for the Danube Salmon

A total of 769 km of Danube salmon habitat are found in the Drina basin alone – amounting to 42% of all remaining Balkan habitat for this species and nearly one-third of the species' global distribution (Freyhof et al., 2015). This is not merely a river segment of importance – it is a cornerstone of the species' survival. The proposed Buk Bijela dam and reservoir, along with planned hydropower plants in the surrounding tributaries, would fragment the core of this ecological cornerstone and erase habitat that is demonstrably still functional. For species such as the Danube salmon, longitudinal connectivity — both upstream and downstream — between the Drina and its tributaries is essential for accessing critical spawning, feeding, and refuge habitats. Conservation action must therefore prioritize maintaining the ecological functionality of existing systems rather than relying on post-impact restoration.

Fig.3. The UDB is one of the Danube salmon's last strongholds, holding nearly one-third of its global habitat. Planned dams like Buk Bijela threaten to fragment this vital ecosystem and disrupt key migration routes.
© Benedikt Reisner

Connectivity: A Functional Imperative for the Danube Salmon & its accompanying species

The Danube salmon, along with the broader fish community of the region, relies on a network of interconnected river habitats that remain accessible both spatially and seasonally throughout the year. In the UDB, spawning migrations into tributaries such as the Ćehotina, Sutjeska and Bistrica rivers were documented during field surveys in 2024, supported by direct observations, redd counts, and local knowledge from fisheries authorities (Pinter & Gruber, 2024). These movements are timed to specific thermal and hydrological cues, underscoring the sensitivity of the Danube salmon to flow regulation. Temperature and flow interruptions caused by hydropeaking operations – already observed due to the Piva Dam – can directly affect spawning activity, egg and juvenile fish survival. Recent findings from Danube tributaries clearly illustrate that fragmentation leads to missing age classes and low juvenile recruitment despite the presence of adult fish (Pinter et al. 2024). This suggests that ecological connectivity as well as intact hydrological and sediment dynamics - not just habitat availability - are essential for a functionally reproducing population. For the organisms of the Drina River, especially migratory fish species such as the Danube salmon, free upstream and downstream migration as well as lateral connectivity (accessibility of tributaries) is essential, as they depend on intact migratory corridors between spawning, feeding, and overwintering habitats.

Fig. 4. Free-flowing corridors like the confluence of the Sutjeska and Drina rivers are vital for native fish to complete their life cycle. This site will be submerged by the planned Buk Bijela reservoir.
© Kurt Pinter

Fig.5. Construction site Bistrica B2-a during the spawning period of Danube salmon in Spring 2023.
© Kurt Pinter

Fig. 6. Heavy input of fine sediment into the Bistrica River during the spring spawning season of the Danube salmon – caused by hydropower construction – disrupts successful reproduction of the resident fish community.
© Bruno D'Amicis

Stocking as a Limited Tool: The Inadequacy of Hatcheries for Danube Salmon Conservation

The idea that artificial propagation and stocking can compensate for the decline of the Danube salmon population lacks scientific support and overlooks key ecological risks. Numerous studies have demonstrated that hatchery fish exhibit reduced survival, impaired fitness, and diminished reproductive success in the wild (e.g. Araki & Schmid, 2010; Christie, et al. 2012, Christie et al., 2014; McMillan et al., 2023). Moreover, stocked individuals often originate from genetically divergent lineages, resulting in genetic homogenization, outbreeding depression, and erosion of locally adapted traits (Einum & Fleming, 2001; Naish et al., 2007). In contrast, the Danube salmon's population in the Upper Drina continues to reproduce naturally in the wild. Introducing hatchery fish into this system would risk disrupting existing genetic structure and ecological dynamics and is not supported by conservation science as an effective or appropriate measure. We assert that stocking is not an alternative to habitat protection. Stocking must not be used as a mitigation tool to justify habitat destruction. In the case of the Upper Drina, any such proposal must be categorically rejected.

Cumulative impacts of HPP development on the Upper Drina must be assessed based on actual available data and with regard to transnational effects

As stated in Obradovic & Vulevic (2023) management decisions should be grounded in the frame of a Joint Water Management Project of the Drina River Basin. While the Republic of Serbia, Bosnia and Herzegovina (the Republic of Srpska and Federation BiH), and Montenegro have recently started bilateral cooperation, all three countries are signatories to the most important multilateral agreements of water resources management, namely the Water Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki, 1992), the Danube River Protection Convention (Sofia, 1994), the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo, 1991), the Aarhus Convention (1998), as well as the agreement on the Sava River basin (2002). The extent of the planned Buk Bijela reservoir up to the Montenegrin border, renders transboundary environmental impacts unavoidable, underscoring the need for coordinated international management. The same refers to the planned expansion of hydropower development on the Ćehotina River in Montenegro, which is also relevant for Bosnia and Herzegovina.

Environmental Assessments must be based on recognized state-of-art Scientific Standards

Given the ecological sensitivity of the UDB and the conservation status of the Danube salmon, any infrastructure proposal must meet the highest scientific and legal standards for environmental assessment. To comply with international standards and the precautionary principle, assessments must be based on best-available science. Anything less renders approval processes invalid and in conflict with international conservation obligations, listed in the preceding paragraph.

RECOMMENDATIONS FROM THE SCIENTIFIC COMMUNITY

Further expansion of hydropower in the region is incompatible with the conservation needs of this ecologically valuable river system. The scientific community clearly advises against any further development, and at the very least, any proposed projects must undergo comprehensive Environmental Impact Assessments (EIAs). Baseline data for the Environmental Impact Assessment must be complemented through wide-ranging studies to fill up data gaps and strengthen base assumptions on species occurrence and distribution.

We argue that the following are non-negotiable prerequisites for any Environmental Impact Assessment (EIA) concerning this exceptional fish stronghold:

1. Full seasonal surveys of fish fauna, including all life stages of Danube salmon and other endangered fish species.

2. High-resolution mapping of spawning and nursery habitats using drone, eDNA, and telemetry techniques.

3. Full seasonal surveys of fish fauna, including all life stages of *Hucho hucho.*

4. Quantitative modelling of hydrological, sedimentological, and thermal alterations that may be caused by the proposed reservoirs and hydropower operations.

5. Cumulative impact analysis, addressing system-wide effects of multiple existing or planned hydropower plants.

6. Explicit consideration of genetic population structure, connectivity, and the evolutionary significance of local adaptations of Danube salmon.

7. Potential impacts on the population of Danube salmon and other Habitat Directive species living in the adjacent UNESCO site and National Parks, Sutjeska in BiH and Durmitor in Montenegro.

8. Assessment of downstream and transboundary effects.

A protection and management strategy for the Danube salmon and the aquatic habitats must be developed with the aim of sustainable and socio-economically valuable use of the landscape and its resources.

Efforts should be undertaken to remediate the current hydro- and thermal peaking load generated by the operating HPP on the Piva River, as it puts additional pressures on the fish species in the Upper Drina River.

THE UNDERSIGNED MEMBERS OF THE SCIENTIFIC COMMUNITY

1. DDipl.-Ing. Dr. Kurt Pinter Institute of Hydrobiology and Aquatic Ecosystem Management, BOKU University, Vienna, Austria
2. Assoc. Prof. Dr. Steven Weiss Karl-Franzens-University, Graz, Austria
3. Univ.Prof. DI Dr. Stefan Schmutz Institute of Hydrobiology and Aquatic Ecosystem Management, BOKU University, Vienna, Austria
4. PhD Barna Páll-Gergely HUN-REN Centre for Agricultural Research, Hungary
5. Assoc. Prof. Zoran Marčić Faculty of Science, Zagreb, Croatia
6. BSc Laura Jasmin Haslinger BOKU University, Vienna, Austria
7. Dr. Gertrud Haidvogl BOKU University, Vienna, Austria
8. DDipl.-Ing. Dr. Carina Seliger BOKU University, Vienna, Austria
9. Dr. Franz Greimel Institute of Hydrobiology and Aquatic Ecosystem Management, BOKU University, Vienna, Austria
10. Dr. Jose Manuel Zamora Marin Miguel Hernandez University, Spain
11. Dr. Alban Kuriqi University of Lisbon, Portugal
12. Ass. Prof. Mag. PhD Simon Vitecek University of Innsbruck, Austria
13. Univ.Prof. emerit. Dr. Gerhard J. Herndl University of Vienna, Austria
14. Ass.Prof. DI Dr. Rafaela Schinegger BOKU University, Vienna, Austria
15. MSc Justine Illana Carey BOKU University, Vienna, Austria
16. Ao Univ. Prof. Dr. Hubert Keckeis University of Vienna, Austria
17. Mag. Dr. Anton Weissenhofer University of Vienna, Austria
18. Ass.Prof. DI Dr. Florian Borgwardt BOKU University, Vienna, Austria
19. Assoc. Prof. PhD Maurizio Pinna University of Salento, Italy
20. Univ.Prof. emerit. Dipl.-Ing. Dr. Gerhard Glatzel Austrian Academy of Sciences, Austria
21. MSc Anna-Lisa Dittrich BOKU University, Vienna, Austria
22. Assoc. Prof. Priv.Doz. Dr. Wolfram Graf BOKU University, Vienna, Austria
23. Prof. Dr. Stoyan Vladimirov Beshkov National Museum of Natural History, Sofia, Bulgaria
24. Prof. Dr. Uwe Simon University of Graz, Austria
25. Prof. Dr. Ursula Gaedke University of Potsdam, Germany
26. Prof. PhD Kim Aarestrup DTU Aqua, Denmark
27. Dr. rer. nat. Christian Berg Univerity of Graz, Austria
28. MSc Anthony Basooma BOKU University, Vienna, Austria
29. PhD Ivana Lozanovska University of Lisbon, Portugal
30. Dipl.-Ing. Johannes Hofer aquatic ecologist, Austria
31. Dr.-Ing. David Nijssen German Federal Institute of Hydrology, Germany
32. Dr. Helmut Sattmann Natural History Museum Vienna , Austria
33. Dr. Axel Gruppe Technical University of Munich, Germany
34. Prof. Dr. Aleko Miho University of Tirana, Albania
35. Dipl.-Ing. Gabriel Gruber BOKU University, Vienna, Austria
36. Univ.Prof. Mag. Dr. Stefan Dullinger University of Vienna, Austria
37. MSc Daniel Pelz BOKU University, Vienna, Austria
38. MSc Selvina Çollaku Molecular and Industrial Biotechnology, Albania
39. Prof. Dr. Vicenç Acuña Catañam Institute for Water Research (ICRA), Spain
40. Full Professor PhD Marina Piria University of Zagreb Faculty of Agriculture, Croatia
41. Dr. Paul Meulenbroek BOKU University, Vienna, Austria
42. BSc Georg Rabl BOKU University, Vienna, Austria
43. Dr. Ronald Pöppl BOKU University, Vienna, Austria
44. Doz., Dr. Wolfgang Scherzinger Society for bird protection / Bavaria, Germany
45. Prof. Dr. Heiko Brunken German Ichthyological Society, Germany
46. Univ.Prof. Dr. Breckle Siegmar University of Bielefeld, Germany
47. Bc et Bc Nadija Čehajić BOKU University, Vienna, Austria
48. Univ.Prof. emerit. Dr. Roland Psenner University of Innsbruck and Eurac Research, Austria
49. Prof. Dr. Dr. h.c. Hans-Otto Pörtner Alfred-Wegener-Institute, Germany
50. Dipl.-Ing. Dr. Thomas Kaufmann Head of freiwasser office, Austria
51. Prof. Dr. Jonathan W Moore Liber Ero Chair of Coastal Science and Management, Director of the Aquatic Research Cooperative, Simon Fraser University, Canada
52. Dr. Waltraud Pinter Biologist, Austria
53. Prof. Dr. Emili García-Berthou University of Girona, Spain
54. Dr. Eike Neubert Natural History Museum, Bern, Germany
55. MSc Marlene Schürz BOKU University, Vienna, Austria
56. Dr. Stefan Ossyssek BUND Naturschutz in Bayern e.V., Germany
57. Full Professor PhD Sergi Sabater University of Girona and Catalan Institute for Water Research, Spain
58. Univ.Prof. emerit. Director Jack A Stanford Flathead Lake Biological Station, University of Montana, USA
59. Prof. Dr. Ingolf Kühn Martin Luther University Halle Wittenberg, Germany

THE UNDERSIGNED MEMBERS OF THE SCIENTIFIC COMMUNITY

60. Dr. Reinhard Kikinger retired, Austria
61. Priv. -Doz. Dr. Matthias Stöck Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB), Germany
62. Dr. Traudlinde Elisabeth Aigner retired, Austria
63. ME Nina Micic NGO Red Cross Novo Sarajevo, Bosnia and Herzegovina
64. Dr. Avdul Adrović University in Tuzla, Bosnia and Herzegovina
65. Dist. Univ.Prof. Nathan LeRoy Poff Department of Biology, Colorado State University, USA
66. MSc BE Kristof Reuther Freshwater Ecologist, Switzerland
67. Chief of Sector Jula Selmani National Agency of Protected Areas in Albani, Albania
68. MSc Samela Selimović University of Tuzla, Bosnia and Herzegovina
69. Univ.Prof. emerit. Dr. Mathias Jungwirth Institute of Hydrobiology and Aquatic Ecosystem Management, BOKU University, Vienna, Austria
70. Ass.Prof. PhD Darja Husejnagić University in Tuzla, Bosnia and Herzegovina
71. Dr. Thomas Wrbka Dept. Botany & Biodiversity Research, University of Vienna, Austria
72. Prof. Dr. Vesna Hadziavdic University of Tuzla, Bosnia and Herzegovina
73. MSc Adna Saliharević Ćorić University of Tuzla, Bosnia and Herzegovina
74. BSc Vildana Beslic Teaching Assistant, Faculty of Natural Science and Mathematics, University of Tuzla, Bosnia and Herzegovina
75. Dr. Ivan Špelić University of Zagreb Faculty of Agriculture, Croatia
76. Dr. Mag. Gernot Kunz Karl-Franzens-University, Graz, Austria
77. MSc Suada Cipurković University of Tuzla, Bosnia and Herzegovina
78. Dr. Christoph Muster University of Greifswald, Germany
79. Mag. Wolfgang Paill Head of Natural History Museum Graz, Austria
80. Assoc. Prof. PhD Jasmina Kamberović University of Tuzla, Bosnia and Herzegovina
81. Dipl.-Ing. Alexander Mrkvicka Management of nature reserves, Austria
82. Univ.Prof. emerit. DI Dr. Johann-Wolfgang Weinmeister BOKU University, Vienna, Austria
83. Dr. David Farò Leibniz Institute of Freshwater Ecology and Inland Fisheries, Germany
84. Dr. Hajrija Hamidovic University of Tuzla, Bosnia and Herzegovina
85. Prof. Dr. Spase Shumka Agricultural University of Tirana, Albania
86. PD Dr. Mario F.Broggi Former Director Swiss Federal Institute for Forest, Snow and Lanscape Research, Liechtenstein
87. Dr. Mag. Winfrid Herbst Naturschutzbund Salzburg, Austria
88. Dr. Karl Hülber University of Vienna, Austria
89. Dipl.-Ing. Matthias Kuhn Nationalpark Donau Auen, Austria
90. Univ.Prof. emerit. Dr. Walter Arnold University of Veterinary Medicine, Vienna, Austria
91. MSc. Santiago Poch Cartañá Institute of Aquatic Ecology, University of Girona, Spain
92. Univ.Prof. Dr. Friedrich Schiemer University of Vienna, Austria
93. Prof. Dr. Jose Antonio Donázar Doñana Biological Station (Spanish Council for Research), Spain
94. Univ.Prof. Dr. Ruben Sommaruga University of Innsbruck, Austria
95. Assoc. Prof. Dr. Amela Hercegovac Biology of cell, genetic and microbiology, Bosnia and Herzegovina
96. Prof. Edina Hajdarević University in Tuzla, Bosnia and Herzegovina
97. MSc Anna Rosa Schöpfer Austrian Biologist Association, Austria
98. MSc Melisa Šehić University of Tuzla, Bosnia and Herzegovina
99. MSc BEd Marian Gratzer Nature Conservation - Naturschutzbund , Austria
100. Dr. Astrid Schmidt-Kloiber BOKU University, Vienna, Austria
101. Prof. Elvira Hadziahmetovic Jurida University of Tuzla, Bosnia and Herzegovina
102. Prof. Francisco Martinez-Capel Universitat Politecnica de Valencia, Spain
103. Univ.Prof. Dr. Franz Essl Department of Botany and Biodiversity Research, University Vienna, Austria
104. PhD Jan KotuszMuseum of Natural History, University of Wroclaw, Poland
105. BSc MA Johanna Gunczy Universalmuseum Joanneum, Austria
106. PD Prof. Mag. Dr. Franz Jirsa University of Vienna, Austria
107. Dr. Dani Boix GRECO, Institute of Aquatic Ecology & Department of Environmental Sciences, University of Girona, Spain
108. Dr. Rifat Omerovic University of Tuzla, Bosnia and Herzegovina
109. Prof. Samir Karasuljić University of Tuzla, Bosnia and Herzegovina
110. MSc Jasmin Sadikovic Green Osijek, Croatia
111. Univ.Prof. Dr. Gabriel Singer University of Innsbruck, Austria
112. Dr. Susanne Muhar BOKU University, Vienna, Austria
113. Dr. Josep Lloret CSIC, Spain
114. MSc Barbara Jechsmayr University of Innsbruck, Austria
115. Prof. Ferdinand Bego University of Tirana, Faculty of Natural Sciences, Albania

THE UNDERSIGNED MEMBERS OF THE SCIENTIFIC COMMUNITY

116. MA Elisabeth Huber Biologist, Austria
117. BSc Cinzia Raviscioni University of Innsbruck, Austria
118. PhD Manu Esteve Independent Researcher, Spain
119. Assoc. Prof. Samra Sadikovic Prirodno-matematički fakultet, University of Tuzla, Bosnia and Herzegovina
120. Assoc. Prof. Samra Moranjkić University of Tuzla, Bosnia and Herzegovina
121. Dr. Andrés Mellado-Díaz Tragsatec, Spain
122. MSc Jan Martini University of Innsbruck, Austria
123. MSc Lukas Thuile Bistarelli University of Innsbruck, Austria
124. Prof. Dr. Ir. Piet Verdonschot Wageningen Environmental Research, Netherlands
125. Univ.Prof. Amira Cipurkovic Faculty of Natural Science and Mathematics, Bosnia and Herzegovina
126. Dr. Carlos García de Leaniz Universidad de Vigo, Spain
127. Prof. Dr. Dipl.-Chem. Bernd Gerken Aueninstitut für Lebendige Flüsse, Leipzig, Germany
128. Bsc Serafin Kattus University of Innsbruck, Austria
129. Univ.Prof. emerit. PhD Gary D. Grossman University of Georgia, USA
130. Assoc. Prof. Albert Ruhi Freshwater Ecology and Conservation, University of California, Berkeley, USA
131. Dr. Maurice Kottelat Past President, European Ichthyological Society, Switzerland
132. PhD Dimitar Doychev Dimitrov Senior Assistant, Shumen University, Bulgaria
133. Collab. Prof. Frederic Casals Dept. of Animal Science, Universitat de Lleida, Spain
134. Dr. Mathias Lohr Technische Hochschule Ostwestfalen-Lippe, Germany
135. Director William O. McLarney Stream Biomonitoring Programs in Norrh Carolina/Georgia and Costa Rica/Panama, Mainspring Conservation Trust and Asociacion ANAI, USA
136. Dr. Jani Simo Marka Department of Biology, Faculty of Natural Sciences, University of Tirana, Albania
137. Assoc. Prof. Nevila Broli Faculty of Natural Science, University of Tirana, Albania
138. Prof. Johan Höjesjö University of Gothenburg, Sweden
139. Dr. Günther Unfer BOKU University, Vienna, Austria
140. BSc Roman Burgsteiner Universalmuseum Joanneum, Austria
141. Dipl.-Ing. Eva Maria Finsterbusch Landesamt für Umwelt, Mainz, Germany
142. PhD Daniel Bruno Universidad Miguel Hernández de Elche, Spain
143. PhD Joana Maria Martelo Center for Ecology, Evolution and Environmental Changes, University of Lisbon , Portugal
144. Dr. Bror Jonsson Norwegian Institute for Nature Research, Norway
145. Dr. Carlos Palacin-Lizarbe University of Eastern Finland, Finland
146. Dr. Antonino Duchi Independent Researcher, Italy
147. MSc Emir Delić Biodiversity expert, Resource Environmental Center (REC), Bosnia and Herzegovina
148. PhD Maja Zagmajster University of Ljubljana, Biotechnical Faculty, Slovenia
149. BSc Annasibila Požrl National Institute of Biology, Slovenia
150. Director Shaun Leonard Wild Trout Trust, United Kingdom
151. Dr. Špela Di Batista Borko University of Graz, Austria
152. Dr. Tim Jacklin Wild Trout Trust, United Kingdom
153. Dr. Polona Pengal Institute REVIVO, Slovenia
154. PhD Amelie Huber EuroNatur Foundation, Germany
155. Dr. Rubén del Campo Department of Ecology & Hydrology, University of Murcia, Spain
156. Dr. Zeynep Ersoy Universidad Rey Juan Carlos, Spain
157. Dr. Thibaut Rota Scuola Universitaria della Svizzera Italiana, Switzerland
158. Mag. rer. nat. Christian Pichler-Scheder blattfisch e.U., Austria
159. Univ.Prof. emerit. Dr. Narcís Prat University of Barcelona, Spain
160. Dr. Andreas Bruder University of Applied Sciences and Arts of Southern Switzerland, Switzerland
161. Dr. Odei Garcia-Garin University of Girona, Spain
162. PhD h.c. Maria Angeles Puig Spanish Research Council at the Center for Avanced Studies in Blanes (CSIC-CEAB), Spain
163. PhD Miguel-Angel Mateo Spanish National Research Council, Spain
164. Ing. Paul Voskamp Riverine Nature Management, Belgium
165. Prof. Dr. Norbert Müller University Applied Sciences Erfurt, Germany
166. Prof. Dr. Michael Mutz Brandenburg University of Technology, Cottbus-Senftenberg, Germany
167. PhD Alen Lepirica Zaštitmo rijeku Drinu, Bosnia and Herzegovina
168. Prof. Ferzileta Gjika Bard Early College, USA
169. PhD Nuria Catalan Scientific researcher CEAB/CSIC, Spain
170. Assoc. Prof. Sabina Hrustić University of Tuzla, Bosnia and Herzegovina
171. Prof. Manuel Augusto Simões Graça University of Coimbra, Portugal

THE UNDERSIGNED MEMBERS OF THE SCIENTIFIC COMMUNITY

172. PhD Zbigniew Kasprzykowski University of Siedlce, Poland
173. Dr. Daniel S. Hayes BOKU University, Vienna, Austria
174. Prof. emerit. and former UNESCO Chair for Sustainable Rivers Robert J. Naiman University of Washington, USA
175. Dr. Goran Jakšić AQUATIKA-Karlovac FreshwaterAquarium - Public Institute, Croatia
176. Dr. Elena TerzićRuđer Bošković Institute, Croatia
177. MSc Lars Schulz Lower Oder Valley National Park Association, Germany
178. Prof. Helga Stan-Lotter University of Salzburg, Germany
179. Dipl.-Ing. Elias Höck Water Resources Management · Water Engineering, Austria
180. MSc José Carlos Guimarães Lourenço Centre of Molecular and Environmental Biology, Biology Department, University of Minho, Portugal
181. Dr. Thomas Ofenböck Water Manager , Austria
182. Dr. Dipl.-Biol. Elisabeth Bücking Forstliche Versuchsanstalt Baden-Württemberg (retired), Germany
183. MSc Lorissa J Farrell LSHTM, London, United Kingdom
184. Assoc. Prof. Martin Hamel University of Georgia, USA
185. Prof h.c. Dr. Jordan Rosenfeld Institute for the Oceans and Fisheries, University of British Columbia, Canada
186. Prof. Dr. Hans-Peter Grossart Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB) & Potsdam University, Germany
187. PhD Joseph Edward Flotemersch EPA (retired), USA
188. Assoc. Prof. Laura Gjyli Aleksandêr Moisiu University of Durres, Albania
189. Dr. Ana Isabel Negro Universidad de Salamanca, Spain
190. Dr. Javier Morales Martín Biologist, Spain
191. Prof. Mark Gessner Leibniz Institute of Freshwater Ecology (IGB), Germany
192. MSc Bruno D'Amicis Freelance environmental photo journalist and author, Italy
193. MSc Gerard Mas Jiménez Centre d'Estudis Avançats de Blanes-Consejo Superior de Investigaciones Científicas, Spain
194. Dr. Sibylle Schroer Leibniz Institute of Freshwatwr Ecology and Inland Fisheries, Germany
195. Dr. Christian Wolter Leibniz Institute of Freshwater Ecology and Inland Fisheries, Germany
196. MSc Pietro Steffano cirf (Italian center for river restoration), Italy
197. Dr. Francesco Cottatellucci Università Cattolica del Sacro Cuore Milano, Italy
198. Dr. Sven Meissner Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB), Germany
199. Priv.-Doz. Mag. Dr. Elisabeth Haring Natural History Museum Vienna, Austria
200. Prof. Dr. Michael Succow Michael Succow Foundation, Germany
201. Lecture Professor Jorge R. Sánchez González Universitat de Lleida, Spain
202. Prof. Dr. Hans Dieter Knapp Michael Succow Foundation, Germany
203. Full Professor Sajmir Beqiraj University of Tirana, Albania
204. MScvDragan Koljanin Independent Researcher, Bosnia and Herzegovina
205. Senior researcher Geert De Knijf Research Institute for Nature and Forest (INBO), Belgium
206. BSc Christian Übl Nationalpark Thayatal, Austria
207. MSc Marina Victoria Rios RPTU KL LD, Germany
208. PhD Ivana Lozanovska University of Lisbon, Portugal
209. Dr. Giacomo Assandri Università del Piemonte Orientale, Italy
210. Dipl.-Biol. Klaus-Jürgen Conze GdO e.V. (Gesellschaft deutschsprachiger Odonatologen), Germany
211. Ao. Univ.Prof. emerit. Dr. Johann Waringer Dept. Functional Ecology & Evolution, University of Vienna, Austria
212. Dr.phil. Andrea Waringer-Löschenkohl Dept. Functional Ecology and Evolution, University of Vienna, Austria
213. Dr. Nicola Reiff DGL (German Limnological Society), Germany
214. Dr.-Ing. Klaus Kern Consultant, Germany
215. Dr. Gerhard Imhof limnologist, Austria
216. Dr. Richard Zink Senior Researcher, Austria
217. Dr. Ralf Köhler BUND (Bund für Umwelt und Naturschutz Deutschland) Bundesarbeitskreis Wasser, Germany
218. MSc Jonas Mauch Leibniz Institute of Freshwater Ecology and Inland Fisheries, Germany
219. Prof. G Mathias Kondolf Environmental Planning, University of California Berkeley, USA
220. Dr. Hans-Joachim Grommelt BUND (Bund für Umwelt und Naturschutz Deutschland) Bundesarbeitskreis Wasser, Germany
221. Prof. Dr. Erhard Christian BOKU University, Vienna, Austria
222. Univ.Prof. Dr. emerit. Giselher Edgar Kaule University of Stuttgart, Germany
223. Full Professor PhD Југослав Бруји ћ Department of Sylviecology, Faculty of Forestry Banja Luka, Bosnia and Herzegovina

224. Research Associate Natsaša Gregorič Bon Research Centre of the Slovenian Academy of Sciences and Arts, Slovenia
225. Univ.Prof. Dr. Thomas Hein BOKU University, Vienna, Austria
226. Assoc. Prof. Dr. Jana Petermann University of Salzburg, Austria
227. Dr. Thomas Fuß University of Innsbruck, Department of Ecology, Austria
228. Mr Gareth Pedley Conservation officer, Wild Trout Trust, United Kingdom
229. Prof. Dr., PhD Michael Getzner TU Wien, Austria
230. PhD Libor Zavorka WasserCluster Lunz, Austria
231. Trout in the Town Officer Theo Pike Wild Trout Trust, United Kingdom
232. Dr. Daniel Ayllón Universidad Complutense de Madrid, Madrid, Spain
233. Prof. Dr. Andreas Tribsch University of Salzburg, Austria
234. Mag. Anita Eschner Natural History Museum Vienna, Austria
235. MSc Nina Lončarević Assistant researcher, Slovenia
236. MSc Eirini Linardaki Project Manager, MedINA, Greece
237. Prof. Dr. Andreas Jechow Brandenburg University of Applied Sciences, Germany
238. PhD Adriano Palazzi University of Milan, Italy
239. BSc Martin Dubuc University of Innsbruck, Austria
240. MSc Samuel Halter Global Change Ecology, University of Bayreuth, Switzerland
241. Adjunct Faculty, MA Kelsey Aho University of Alaska Fairbanks USA, Croatia
242. MSc Dora Kouvarda HCMR, Greece
243. Mag. Martina Adlboller-Brunner, Austria
244. Senior Hydrologist Alejandro R. Dussaillant UK Centre for Ecology & Hydrology, United Kingdom
245. Prof. Luc De Meester Leibniz Institute of Freshwater Ecology and Inland Fisheries, Berlin Belgium
246. Dr. Catherine Boisnenau University of Tours, France
247. Mr. Dušan Jesenšek Zavod SARA VURI, Slovenia
248. Bsc Tatjana Noah Steixner University of Innsbruck, Austria
249. MSc Sabrina Eidinger Freshwater ecologist, Austria
250. PhD Béla Csányi Independent freelancer hydrobiologist, Hungary
251. Dr. Jasna Vukić Charles University in Prague, Czech Republic
252. Dr. Hannes Augustin Naturschutzbund Salzburg, Austria
253. MSc Jakob Neuburg BOKU University, Vienna, Austria
254. Mag. Dr. Andrea Funk BOKU University, Vienna, Austria
255. Priv-Doz. PhD Alexander Franz Medical University of Vienna, Austria
256. Dr. Johannes Rüdisser University of Innsbruck, Austria
257. BSc Marie WahlBOKU University, Vienna, Austria
258. Full Professor DSc Saša Marić Faculty of Biology, University of Belgrade, Serbia
259. Dipl.-Ing. Kevin Merl BOKU University, Vienna, Austria
260. PhD Tijana Veličković Faculty of Science, University of Kragujevac, Serbia
261. Dr. David Stanković National Institute of Biology, Slovenia
262. Dr. rer. nat. Winfried Bücking Former Director BUND Regional Group Baden-Württemberg Germany
263. MSc Cornelia Maehr EuroNatur, Germany
264. Univ.Prof. Mag. Dr. Thomas Frank BOKU University, Vienna, Austria
265. Assoc. Prof. PhD Natasa Gregoric Bon Postgraduate School ZRC SAZU, Slovenia

REFERENCES

Araki, H. & Schmid, C. (2010): Is hatchery stocking a help or harm?: Evidence, limitations and future directions in ecological and genetic surveys. Aquaculture, 308, 2-11pp.

Christie, M. R., Marine, M. L., French, R. A., Waples, R. S., & Blouin, M. (2012): Effective size of a wild salmonid population is greatly reduced by hatchery supplementation. Heredity, 109(4), 254-260.
Christie, M. R., Ford, M. J., & Blouin, M. S. (2014). On the reproductive success of early-generation hatchery fish in the wild. Evol Appl 7: 883–896.

Deinet, S., Flint, R., Puleston, H., Baratech, A., Royte, J., Thieme, M. L., Nagy, S., Hogan, Z. S., Januchowski-Hartley, S. and Wanningen, H. (2024): The Living Planet Index (LPI) for migratory freshwater fish 2024 update - Technical Report. World Fish Migration Foundation, The Netherlands.

Einum, S. & Fleming, I. A. (2001): Implications of stocking: ecological interactions between wild and released salmonids. Nordic Journal of Freshwater Research, 75, 56-70.

Freyhof, J.; Weiss, S.; Adrović, A.; Ćaleta, M.; Duplić, A.; Hrašovec, B.; Kalamujić, B.; Marčić, Z.; Milošević, D.; Mrakovčić, M.; Mrdak, D.; Piria, M.; Schwarz, U.; Simonović, P.; Šljuka, S.; Tomljanović, T.; Zabric, D. (2015): The Huchen Hucho hucho in the Balkan region: Distribution and future impacts by hydropower development. RiverWatch & EuroNatur, 30 pp.

Freyhof J, Brooks E. (2011): European Red List of Freshwater Fishes. Publications Office of the European Union: Luxembourg.

He, F., Zarfl, C., Tockner, K., Olden, J. D., Campos, Z., Muniz, F., ... & Jähnig, S. C. (2024): Hydropower impacts on riverine biodiversity. Nature Reviews Earth & Environment, 5(11), 755-772.

McMillan, J. R., Morrison, B., Chambers, N., Ruggerone, G., Bernatchez, L., Stanford, J., & Neville, H. (2023): A global synthesis of peer-reviewed research on the effects of hatchery salmonids on wild salmonids. *Fisheries Management and Ecology*, *30*(5), 446-463.

Naish, K. A., Taylor III, J. E., Levin, P. S., Quinn, T. P., Winton, J. R., Huppert, D., & Hilborn, R. (2007): An evaluation of the effects of conservation and fishery enhancement hatcheries on wild populations of salmon. Advances in marine biology, 53, 61-194.

Obradovic, V. and A. Vulevic, A. (2023): Water resources protection and water management framework in western Balkan countries in Drina River Basin. Acadlore Trans. Geosci., vol. 2, no. 1, pp. 24-32, 2023.https://doi.org/10.56578/atg020103

Pinter, K. and Gruber, G. (2024): Distribution and spawning activity of the Danube salmon (*Hucho hucho*) in the Upper Drina River. Scientific report, pp.27.

Pinter, K., Ratschan, C., Unfer, G., Weiss, S., Jungwirth, M., & Schmutz, S. (2024): History, life history, and fate of a salmonid flagship species: the Danube salmon. Fisheries, 49(6), 269-279.

RiverWatch (2024) - Society for the Protection of Rivers. Available from:
riverwatch.eu/sites/default/files/uploads/Studien/2024_2610_Huchen_Drina-min.pdf

Riverwatch (Ed.) (2019): Drina: Environmental permit for Buk Bijela hydropower plant cancelled. Accessed 20 June 2025.
https://www.balkanrivers.net/en/news/drina-environmental-permit-for-buk-bijela-hydropower-plant-cancelled

Schmutz, Stefan & Sendzimir, Jan. (2018). Riverine Ecosystem Management: Science for Governing Towards a Sustainable Future. 10.1007/978-3-319-73250-3.

Schmutz, S.; Jungwirth, M.; Ratschan, C.; Siemens, M. v.; Guttmann, S.; Paintner, S.; Unfer, G.; Weiss, S.; Hanfland, S.; Schenekar, T.; Schubert, M.; Brunner, H.; Born, O.; Woschitz, G.; Gum, B.; Friedl, T.; Komposch, C.; Mühlbauer, M.; Honsig-Erlenburg, W.; Hackländer, K.; Haidvogl, G.; Eberstaller, J.; Friedrich, T.; Geist, J.; Gumpinger, C.; Graf, C.; Hofpointner, M.; Honsig-Erlenburg, G.; Latzer, D.; Pinter, K.; Rechberger, A.; Schähle, Z.; Schotzko, N.; Seliger, C.; Sutter, G.; Schröder, W.; Zauner, G. (2023): Der Huchen stirbt aus – was tun? Gefährdungsfaktoren und notwendige Maßnahmen in Bayern und Österreich. Sonderheft Österreichs Fischerei, Herausgegeben vom Österreichischen Fischereiverband. Wien.

Schwarz, U., 2025. Hydropower Projects on Balkan Rivers – 2024 Update. RiverWatch &EuroNatur, Vienna/Radolfzell, 41 pp.

Weiss, S.; Apostolou, A.; Đug, S.; Marčić, Z.; Mušović, M.; Oikonomou, A.; Shumka, S.; Škrijelj, R.; Simonović, P.; Vesnić, A.; Zabric, D. (2018): Endangered Fish Species in Balkan Rivers: their distributions and threats from hydropower development. Riverwatch & EuroNatur, 162 pp.

World Bank Group WBIF, (2017): Support to Water Resources Management in the Drina River Basin. Project ID NO.1099991 DRINA RIVER BASIN ROOF REPORT. 95 pp. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/183341530114587734/support-to-water-resources-management-in-the-drina-river-basin-drina-river-