

DAM REMOVAL PROGRESS 2024



More than 500 barrier removals in a year – a new European record

Removal of the Holstenkoski Dam on the Aneriojoki River, Finland
© Manu Vihtonen - WWF

Removal of the Marybank Weir on the Balnagown River, Scotland, UK
© James Symonds (Cromarty Firth Fishery Board)

INTRODUCTION

European rivers have been fragmented by more than 1.2 million instream barriers (Belletti et al. 2020), and more continue to be built. Dam Removal Europe (DRE) coalition has been publishing an annual progress report for the last five years to evaluate the advancement of EU policy implementation and to analyse the progress and impact of barrier removal¹ as a river restoration measure Europe-wide (Table 1; Figure 1). Such a comprehensive analysis of barrier removal implementation in Europe is imperative to also ensure that false facts and misleading information regarding this practice are not be disseminated to the public, and if they do, that they will be debunked based on actual facts and scientific evidence², as was recently done with the false claims that dam removals were to blame for the flooding in Valencia, Spain in October 2024 (Garcia de Leaniz & Mouchlianitis 2024).

The significance of river connectivity and barrier removal has only recently been recognized at the European level, when the European Union's Nature Restoration Regulation³ officially came into force on August 18, 2024, marking a significant milestone in Europe's commitment to restoring degraded ecosystems. This Regulation sets legally binding targets to revive nature, combat biodiversity loss, and enhance climate resilience. A key provision of the Regulation is the restoration of at least 25000 km of rivers to a free-flowing state by 2030 (Article 9), making it a game-changer for freshwater ecosystems and barrier removal efforts across Europe.

This objective directly addresses the pervasive issue of river fragmentation caused by obsolete barriers such as dams, weirs, and culverts. Removing these structures is essential not only for reestablishing natural water flow, sediment transport, and nutrient cycles, which in turn supports biodiversity and enhances ecosystem services, but also for eliminating the risk of failure posed by these obsolete barriers².

With the Regulation now in effect, attention turns to the National Restoration Plans. Each EU Member State must submit a draft within two years (by mid-2026), outlining how they will meet the Regulation's targets, including those for freshwater ecosystems. For barrier removal advocates, this presents a significant opportunity to accelerate efforts to dismantle obsolete and harmful barriers and reverse centuries of damage to Europe's freshwater ecosystems. However, without clear commitments, Member States may focus on other restoration actions rather than barrier removal. Barrier removal should remain at the heart of Europe's river restoration efforts—bringing life back to the waterways and securing a healthier, safer, more resilient future for both people and nature. Barrier removal has been adopted also by non-EU Member States which have already started implementing this tool to restore river connectivity and ecological continuity or paving the way to start utilizing it in the near future by inventorying and assessing their river infrastructure (Figure 1).

¹ A barrier must have been removed through the full vertical extent of the structure for the total width (total removal) or a significant portion of the stream width (partial removal) permitting fish passage and ecological flow. Technical fishways and bypasses were not considered barrier removals and thus were not included in this report

² <https://damremoval.eu/wp-content/uploads/2024/07/Factsheet-Final.pdf>

³ https://environment.ec.europa.eu/topics/nature-and-biodiversity/nature-restoration-law_en

YEAR	NUMBER OF REMOVED BARRIERS	NUMBER OF COUNTRIES
2020	101	11
2021	239	17
2022	325	16
2023	487	15
2024	542	23

Table 1.
Number of barrier removals and of countries that reported removals to Dam Removal Europe per year. Note: England, Scotland, Wales and Northern Ireland are considered under UK as a single unit

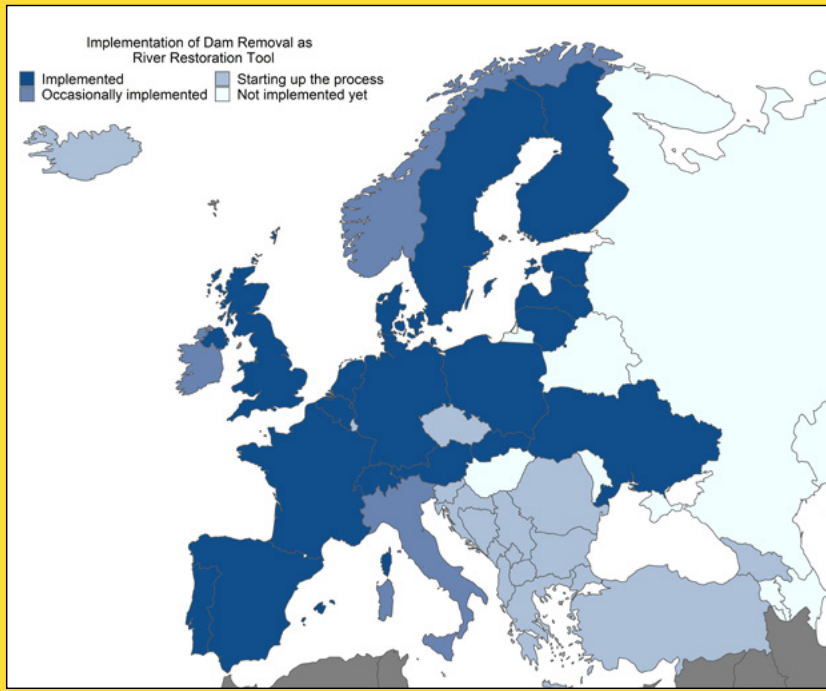


Figure 1.
Implementation of barrier removal as a river restoration tool in Europe. Note: barrier removals which took place in England, Scotland, Wales and Northern Ireland are considered under UK as a single unit; Implemented = barrier removals occurred at least in three years since 2020; Occasionally implemented = one or a few barrier removals occurred sporadically; Starting up the process = barrier removals executed once or barrier inventorying has recently happened/is currently happening; Not implemented yet = no actions relevant to barrier removal known

DATA COLLECTION & RESULTS

The data presented in this report were provided by ministries, municipalities, water agencies, river trusts, NGOs, scientists, researchers, and river restoration practitioners. Accurate estimations of the total number of barrier removals executed per year is a highly complex endeavor because the verification process of such projects and whether they satisfy

the DRE criteria of a barrier removal is time-consuming. A centralized process to gather such information nationwide is in place in countries like Spain, France and Denmark, but is lacking in most European countries. In that respect, the final number of removed barriers reported herein should be considered an underestimation.

⁴ Finland has removed approximately the same number of barriers per year in the past 5-6 years. Those removals were not included in the previous DRE reports due to the fact that there were no resources available to provide specific details and location of each barrier
⁵ Type was available for 288 out of the 542 barriers that were included in this report
⁶ Height was available for 218 out of the 542 barriers that were included in this report

Based on the information gathered, DRE reports that in 2024:

- ✂ At least 542 barriers were removed in 23 European countries (Figure 2)
- ✂ Bosnia and Herzegovina, Croatia, Czech Republic and Turkey officially removed their first barriers ever
- ✂ Finland was the new trailblazer of barrier removal in Europe (Figures 2-3)⁴, followed by France, Spain and Sweden
- ✂ 45 % of the removed barriers were culverts and 43 % were weirs⁵. Dams were the next most common type (8 %), followed by fords and sluices
- ✂ 65 % of the removed barriers were lower than 2 m, 34 % were 2-5 m high and 1 % were more than 5 m high⁶
- ✂ 16 of the removed barriers were used or originally built for hydropower production⁷
- ✂ More than 2900 km on the longitudinal axis were reconnected through barrier removals⁸

The total number of removals in 2024 represents an 11 % increase from the previous year (487 barrier removals in 2023; Mouchlianitis 2024; Table 1). The increasing trend in the number of barrier removals executed per year in Europe (Table 1) may have been less pronounced as the data provided to DRE are considered incomplete. However, the process of data collection is being improved year after year, enabling DRE to provide a Europe-wide overview of barrier removal projects with increasing accuracy.

⁷ Original use was available for 146 out of the 542 barriers that were included in this report
⁸ Number of reconnected km was available for 206 out of the 542 barriers that were included in this report. The length of the reconnected river sections was calculated as the sum of the km to the first barrier upstream and the first barrier downstream (if any) of the location of each removed barrier

In summary, eight more European countries reported barrier removals in 2024 than in 2023 (Table 1). Unlike in 2023 (Mouchlianitis 2024), most of the removed barriers in 2024 were culverts. The number of removed weirs was almost as high. Culverts and weirs have a high probability of being old and/or obsolete and can be removed in a cost-efficient way (Garcia de Leaniz and O’Hanley 2022), which explains their high prevalence in the data. In addition, most of the removed barriers were low-head structures (<2 m high) as was the case in 2023 (Mouchlianitis 2024). These small barriers fragment some of the most biologically important habitat in river headwaters. Such structures are also the most abundant longitudinal riverine barriers throughout Europe and can be removed easier than larger structures, whose removal might also face stronger opposition from local communities and stakeholders (Belletti et al. 2020). Lastly, this year’s report follows the trend of the previous ones, as a new record in the total number of removals has been reported (Table 1).

DAM REMOVAL EUROPE

Dam Removal Europe (DRE) is a coalition of six organizations: the World Wide Fund For Nature, The Rivers Trust, The Nature Conservancy, the European Rivers Network, Rewilding Europe, and Wetlands International Europe Association. The goal of DRE is to restore the free-flowing state of rivers and streams in Europe and to establish barrier removal as the premier restoration tool and to mainstream it as a standard practice. Through a bottom-up process DRE has created a continuously growing European network and is working towards a holistic approach to remove barriers.

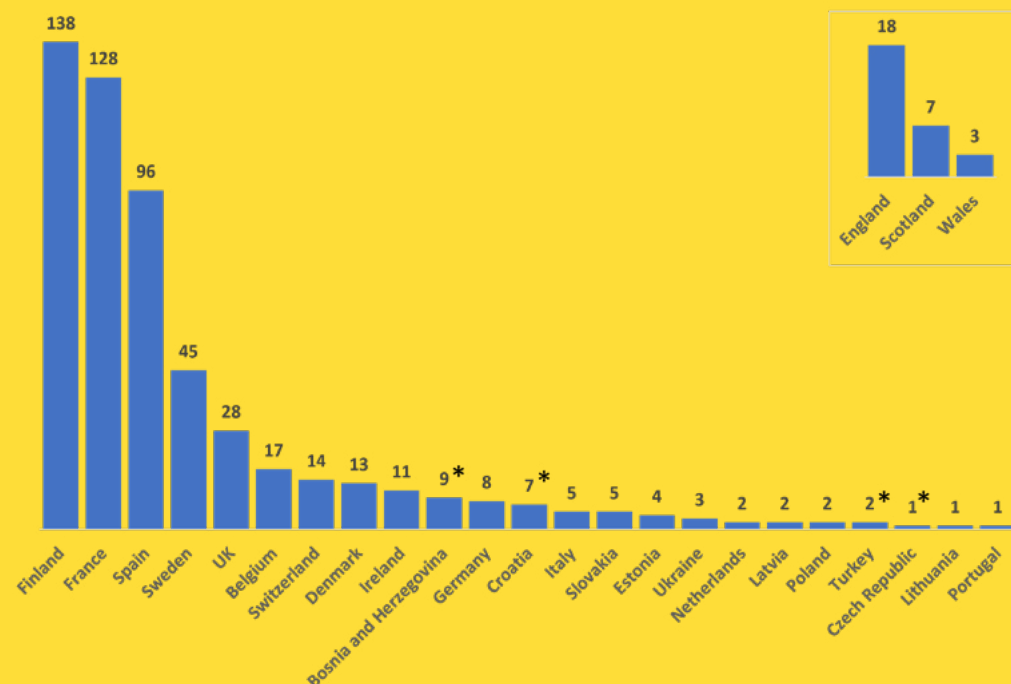


Figure 2. Number of removed barriers per country in 2024. Notes: the inset shows the removals per country in the UK. The countries that officially removed their first barriers in 2024 are marked with an asterisk (*)

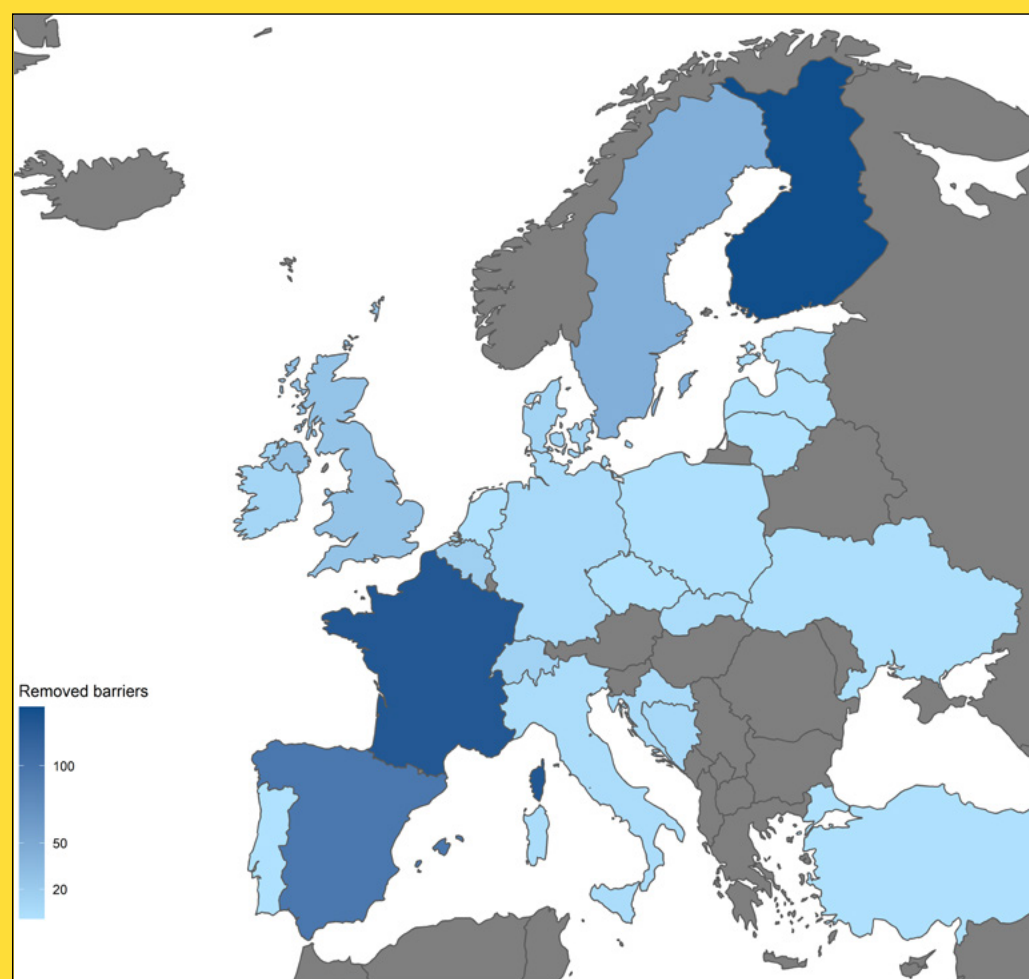


Figure 3. Map of European countries that reported barrier removals in 2024. Colour gradient refers to the number of removals per country. Note: barrier removals which took place in England, Scotland, Wales and Northern Ireland are considered under UK as a single unit

BARRIER REMOVALS IN THE HEART OF CENTRAL APENNINES, ITALY

Five barriers were removed in 2024 on the Giovenco River in the heart of the Central Apennines⁹. The *GIOV & GO – A free-flowing Giovenco* project was led by Rewilding Apennines and supported by key local stakeholders, such as the Abruzzo, Lazio and Molise National Park, and the Municipality of Bisegna. Financial support for the project was provided by the European Open Rivers Programme.

Following the removals, an 11-km stretch of Giovenco River is now flowing freely for the first time in several decades. This intervention is expected to achieve socio-economic benefits for the local community. Through educational and awareness-raising activities the engagement of the locals was strengthened, and the ways they benefit economically are being promoted, for example through the development of nature-based touristic activities in the Giovenco Valley.

The project also aimed to deliver significant ecological benefits. The recently reconnected river reach will become available again for migrating protected and vulnerable aquatic organisms, like the white-clawed crayfish and the Mediterranean trout. Riparian vegetation will also reclaim the restored habitats, enhancing the local biodiversity of mammals, like the European otter, as well as of birds and insects. The natural dynamics of the river will also be re-established, including natural sedimentation, facilitating the reformation of meanders and reversing the previous trend in localized erosion.

This project at Giovenco River could act as a catalyst for further barrier removals in the Central Apennines landscape. Action is being taken to restore further stretches of the river, as well as in other highly fragmented waterways, like the Liri River.

⁹ <https://rewildingeurope.com/news/rewilding-apennines-leads-pioneering-removal-of-river-barriers/>

Figure 4. Removal works of barriers on Giovenco River, Italy © Bruno D'Amicis



BEFORE AND AFTER REMOVAL



EBBARP HYDROPOWER PLANT DAM – BÄLJANE Å RIVER – SWEDEN
© Länsstyrelsen Skåne



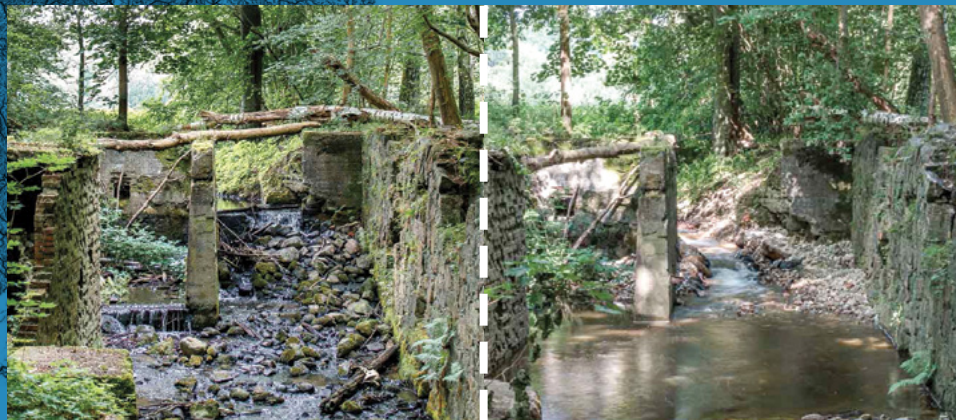
BALLINGLEN BRIDGE WEIR – BALLINGLEN RIVER – IRELAND
© East Wicklow Rivers Trust



PEROFILHO WEIR – PEROFILHO RIVER – PORTUGAL
© Fábio Pinto - ANP / WWF



BEJA DAM – ALŪKSNE RIVER – LATVIA
© (left) Valdis Skudre / (right) Magda Jentgena



WISELKA WEIR – WISELKA RIVER – POLAND
© Rewilding Oder Delta



UNNAMED CULVERT – BIJELA RIJEKA RIVER – CROATIA
© WWF Adria

Figure 5.
Countries in Southeastern Europe where
barrier inventories have recently been
created/are currently being created



FOCUS REGION: SOUTHEASTERN EUROPE

Barrier removal has only occurred sporadically and has yet to be established as a mainstream river restoration tool in Southeastern Europe (Figure 1). However, the practice is gaining attention and the first definitive steps towards the demolition of physical barriers have been taken, and more are happening throughout the region. Among other initiatives, barriers are being mapped systematically (Figure 5), mainly through European Open Rivers Programme-funded projects. These detailed inventories are the first step in achieving the Nature Restoration Regulation's objectives, and they will provide the opportunity to assess the impact, status and utility of barriers and to prioritize the removal of the most detrimental and obsolete structures in the most ecologically beneficial places.

The Scaling up dam removal: implementation plan for Southeastern Europe project aims to accelerate barrier removal in this region. This ongoing, 1.2 million Euro project, funded by the European Open Rivers Programme and now led by WWF Netherlands, brings together several local partners, such as Fauna & Flora, MedINA Greece and the WWF offices in Slovakia and the Adria region. Other partners include

Wetlands International Europe and the European Rivers Network. The project is assisting in the development of funding applications to the European Open Rivers Programme for barrier removals, shape national legislation and policies, and provide expertise and tools for stakeholders.

The key objectives include:

- ✂ **Building the movement in Southeastern Europe by reaching out to new relevant stakeholders, and developing the know-how using a community of practice and through a helpdesk**
- ✂ **Building a pipeline of barriers to be removed in the near future by catalysing and developing opportunities, exploring funding sources, and supporting practitioners to apply for European Open Rivers Programme grants**
- ✂ **Creating more enabling policies through assessing the legal frameworks and by improving integration of barrier removal into the relevant legislation, regulations and administrative procedures in Croatia, Slovakia, Greece and Romania**
- ✂ **Generating and disseminating knowledge which can be used by various target groups to promote barrier removal**

PIONEER CULVERTS REPLACEMENT TO PROTECT PEARL MUSSEL IN BELGIUM

The freshwater pearl mussel (*Margaritifera margaritifera*) is currently listed as "Endangered" on the IUCN Red List ("Critically Endangered" within the EU). Streams flowing through the Forêt d'Anlier in Belgium are home to over 90% of the remaining individuals in the country. Pearl mussels require excellent water quality, rivers with a natural flow, and healthy populations of brown trout (*Salmo trutta fario*) to complete their life cycle, which includes a parasitic stage on a host fish. However, recent fish surveys have shown that trout populations are at depressed levels, a decline linked to significant fragmentation of the small tributaries used as spawning grounds.

Led by Parc naturel Haute-Sûre Forêt d'Anlier, and co-funded by European Open Rivers Programme, this project has achieved remarkable ecological, economic, and social outcomes, contributing to the restoration of the waterbodies in Belgium¹⁰. The

removal of 11 impassable culverts and their replacement with bridges has reopened 28 km of free-flowing river stretches in the Rulles and Anlier catchments, thereby responding to the Water Framework Directive's binding obligation to achieve and maintain "good" ecological status.

The new bridges were built using prefabricated blocks (Figure 6), reminiscent of a popular construction toy, designed to support heavy loads (e.g., logging trucks). This method offers a number of advantages over conventional ones: the natural riverbed is completely restored, assembly is totally dry (no cement nor mortar) which reduces the risk of environmental contamination, and installation is fast, easy and less expensive than traditional construction methods.

This project demonstrated that river restoration can align with forestry operations. Serving as a model for reproducible techniques in barrier removal, it influenced several stream managers which have already initiated similar projects in neighboring areas (in and beyond Belgium).

¹⁰ <https://openrivers.eu/projects/202408611-eleven-culvert-removals-belgium/>

Figure 6. Pioneer culvert replacement technique by a bridge made of prefabricated blocks in Belgium © Parc naturel Haute-Sûre Forêt d'Anlier



TRIWA LIFE PROJECT – A SWEDISH-FINNISH EFFORT

The Torne River International Watershed (TRIWA) LIFE^{11, 12} is a 21-million-Euro transborder project between Sweden and Finland aiming to restore habitats in streams and wetlands suffering detrimental effects from human activity in the catchment of the Torne River NATURA 2000 site (40157 km²). The project area is the entire watershed of the Torne River - approximately the size of Switzerland. The overall goal is to improve the conservation status for species and habitats for the Habitats Directive and reach “good” ecological status according to the Water Framework Directive.

Almost 400 barriers will be removed, ~100 km of watercourses and 2500 hectares of wetlands will be restored. Several species, like salmon, bullhead, otter, freshwater

pearl mussel and green snaketail dragonfly will benefit from the measures. Negative impact will also be minimized by developing a Greener Best Practice for restoration projects. The *TRIWA* project will run from 2023 to 2030. So far, over 100 barriers, including culverts (Figure 7) and dams, have been removed within the project.

The project is funded by the European Union’s LIFE programme, the Region of Norrbotten, the Swedish Agency for Marine and Water Management, the Swedish Environmental Agency, the municipalities of Kiruna, Pajala, Övertorneå, Haparanda, Enontekiö, Kolari, Muonio, Tornio, Pello and Ylitornio. Project partners include the Luleå University of Technology, the Sveaskog AB, the ELY Centre, the Forestry Center in Finland (Metsäkeskus), Metsähallitus, the Natural Resources Institute Finland (LUKE), and the University of Oulu.

¹¹ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/projects-details/43252405/101074158/LIFE2027>

¹² <https://www.lansstyrelsen.se/norrbottn/om-oss/om-lansstyrelsen-i-norrbottnens-lan/internationellt-samarbete/triwa-life/triwa-life.html>

NEXT STEPS

During the last decade, Dam Removal Europe (DRE) has played a pivotal role in building the movement to mainstream barrier removal. Inspiration and educational programs have led to hundreds of removals, reconnecting thousands of kilometers of rivers. These actions restore whole ecosystems, enhancing biodiversity and alleviating the risk of catastrophic structural failure and the resulting impacts to ecosystems, human safety and property. Reversing river fragmentation involves more than removing physical barriers. It must include opening the minds of policymakers and local communities to recognize multiple positive outcomes of barrier removal for biodiversity, water resilience, and reduced flood risk. River restoration has gained significant traction in Europe over the last decade, evolving from a concept to a recognized and crucial strategy to restoring river health and water quality. DRE’s goal is to build on this momentum until barrier removal becomes a routine practice across all European countries. To achieve this, DRE will continue to foster collaboration, share expertise, and highlight and document successful projects through conferences, workshops, seminars, webinars, and reports. The goal is to work with as many relevant practitioners and stakeholders throughout Europe as feasible.

In regions where barrier removal is still an emerging idea, such as the Balkans, DRE will continue to: (a) provide support to kickstart projects, (b) raise awareness of the benefits of barrier removal, (c) develop networks among practitioners to share knowledge and methods, and (d) facilitate the development and sharing stories and case studies to inspire and evoke change. With the recent approval of the EU Nature Restoration Regulation, DRE has a unique opportunity to assist EU countries just beginning their barrier removal journey, while growing the movement in neighboring nations.

DRE maintains the most comprehensive and up-to-date database of removed barriers and barrier removal practitioners in Europe, enabling the monitoring and assessment of river restoration policies and actions continent-wide. DRE is committed to monitoring trends in barrier removal and equipping practitioners with tools, guidance, and technical support. As part of these efforts, DRE offers a toolbox and an open-access online helpdesk (contact person: Foivos Mouchlianitis; foivosmouchlianitis@wwf.nl). For the latest updates on ongoing projects, upcoming events, and expert insights, visit the DRE website (www.damremoval.eu) where you can also subscribe to the DRE newsletter.



Figure 7. Culvert replacement on the Tuollujoki River, Sweden, within the *TRIWA* project © County Administrative Board of Norrbotten

Acknowledgements

DRE coalition wishes to express its gratitude to everyone who provided valuable information/data/ photos on barrier removals for the publication of this report. The author is also grateful to Boverhoff J. for the policy analysis, and to Bendall B., Brink K., Duque I., Quétier F., Royte J., Vilhunen S. and Wanningen H. for reviewing the original draft. This report was produced with the financial support from Fred Foundation, The Nature Conservancy and WWF Netherlands.

References

(1) Belletti B., et al. (2020). More than one million barriers fragment Europe’s rivers. Nature 588: 436–441

(2) Garcia de Leaniz C., Mouchlianitis F.A. (2024). Claims that dam removals were to blame for Valencia floods are false. Nature 636: 299

(3) Garcia de Leaniz C., O’Hanley J.R. (2022). Operational methods for prioritizing the removal of river barriers: Synthesis and guidance. Science of the Total Environment 848: 157471

(4) Mouchlianitis F.A. (2024). Dam Removal Progress 2023. World Fish Migration Foundation

Removal of the Seinäkoski Dam on the Rutajoki River
© Jarmo Pautamo - Apajax Oy





Cite as

Mouchlianitis F.A. (2025). Dam Removal Progress 2024. Dam Removal Europe

Design

Studio Hands

Resources and tools

For more information about barrier removal showcases, events, tools and resources, or if you are interested in becoming a donor and help restoring free-flowing rivers in Europe, visit: www.damremoval.eu

Copyright

Dam Removal Europe, May 2025

