8 FEBRUARY 2022

TO
Client: Senator Nick McKim
Attention:
Tel:
Email:

FROM
Name:
Section:
Tel:
Email:
TRIM Reference:

Dam removal

Thank you for your question relating to dam removal, received on 25 January 2022 by email.

You have asked for:

1. A list of dams around the world that have been removed within an approximate timeframe of the last ten years.
    a. The reasons for those removals, in particular when primary purpose of restoring natural river processes and ecologies.
    b. Any associated project information available, such as success, barriers, challenges and budgets.
    c. Identify any dams that were removed from a World Heritage Area or any other protected area system.

You requested this information by 08/02/2022.

Caveat

This brief covers a large and complex topic and while every effort has been taken to prepare an accurate and concise brief, it may not be fully comprehensive. There are a number of inconsistencies in how barriers in rivers are described and what may be classification as a traditional dam in different counties and in various inventories. Barriers may include ‘dam’, ‘weir’,

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'culvert', 'ford' and 'other'. There are also differences in size categorisations (i.e. small versus large dam) and what this is based on (e.g. capacity versus wall height). A further issue is the availability of documents in languages other than English, making documents difficult to locate and review. We used Google Translate to review some documents, noting there may be issues with the accuracy of translated text. The vast majority of information on dam removals appears to be based on examples from the US and Europe, as such this brief focuses on these two areas. Please let me know if you would like further information on any aspect of this brief.

Dam removals

'Currently, more dams are being removed in North America and Western Europe than are being built'.[1]

A review of the literature indicates that major drivers for dam removal appear to be the restoration of ecological functions on rivers and due to aging and obsolete dam infrastructure. However, it is difficult to identify a common reason across jurisdictions due to differing political, economic, and cultural contexts.[2]

The literature highlights a number of arguments in support of dam removal, such as restoring natural river processes, benefits to tourism and fishing, and for native title rights.[3] However, there are also a number of environmental issues that must be considered; these include the effect of and rate of erosion of sediment trapped in reservoirs, the transport and accumulation of debris downstream of the dam, the impact of a drop in the water table on water management and infrastructure upstream of the dam, and the potential expansions of invasive species.[4]

There are three approaches to the deconstruction of a dam:

- Partial dam removal involves cases where logistical or socio-political factors call for retention of some portion of the dam. As the name suggests only part of the dam is removed (such as a portion blocking fish passage), while other portions remain in place.[5]
- Instantaneous dam removal involves the use of explosives to remove a portion of the dam so that rapid draining of the reservoir follows. The remains of the dam are mechanically removed following the breach.[6]
  - While this method typically releases an extremely high concentration of sediment downstream, it may limit the impact of increased sediment concentration experienced by fish populations to a single spawning season, as opposed to multiple seasons as seen in some staged removals.[7]
- Staged dam removals are often used for taller dams where large amounts of sediment are contained within the reservoir, raising environmental or infrastructure concerns downstream.

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[1] Michal Habel et al., 'Dam and Reservoir Removal Projects: A Mix of Social-Ecological Trends and Cost-Cutting Attitudes', *Scientific Reports* 10, no. 1 (5 November 2020): 19210.

[2] Habel et al.

[3] Habel et al.; Jeffrey J. Duda and J. Ryan Bellmore, 'Dam Removal and River Restoration', in *Encyclopedia of Inland Waters*' (Elsevier, 2021); Klamath River Renewal Corporation, 'The Project', accessed 2 February 2022; Water Technology, 'World's Biggest Dam Removal and Restoration Project', accessed 2 February 2022; Cook Inlet Tribal Council, 'Water Returns to Eklutna', accessed 3 February 2022; Eklutna River Restoration Coalition, 'Eklutna Dam Removal', Restoring the Eklutna River, accessed 3 February 2022; Dam Removal Europe, 'Sélune River Dams, Normandy, France', *Dam Removal Europe* (blog), accessed 4 February 2022; Geoffrey E. Petts and Angela M. Gurnell, 'Hydrogeomorphic Effects of Reservoirs, Dams, and Diversions', in *Reference Module in Earth Systems and Environmental Sciences* (Elsevier, 2021); The Nature Conservancy, 'Removing Barriers to River Health', The Nature Conservancy, accessed 7 February 2022.

[4] Petts and Gurnell, 'Hydrogeomorphic Effects of Reservoirs, Dams, and Diversions'.

[5] Duda and Bellmore, 'Dam Removal and River Restoration'.

[6] Duda and Bellmore.

[7] Duda and Bellmore.

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> This removal allows for the draining of the reservoir to be controlled, allowing for some level of control over sediment levels, while giving time for erosive processes and lateral channel migration to mobilize and redistribute sediment within the system.[8]

While the engineering process of removing a dam is technically straightforward, Duda and Bellmore identify several knowledge gaps that need to be addressed:

> **Decision making**
>
> - Prioritization and optimization tools to aid decision making and select dam removal projects.
> - Numerical modelling, in particular for tracking the fate of stored sediment and ecological outcomes.
> - Tools for estimating the cost of dam removal projects.
>
> **Outcomes of dam removal**
>
> - Assessing cumulative impacts of removing multiple dams from a single watershed.
> - Long-term outcomes of river response and restoration.
> - Quantifying socio-economic effects, such as long-term outcomes to property values, economic trajectories of communities near dam removal projects (e.g., recreation, commercial fishing), cultural resurgence of indigenous peoples, communities, and river economies, as well as other societal benefits.[9]

Duda and Bellmore also discuss limitations of post dam removal studies, highlighting the need for long-term assessment following removal in order to fully understand the ecological effects:

> Most of these studies, no matter their experimental design, have lasted for relatively short durations, and they have evaluated outcomes for a few years around the initiation of dam removal. Long-term evaluations are rare, as most studies have focused upon the time period where rapid physical changes take place in the upstream and downstream vicinity of the dam.[10]

United States of America

The United States National Inventory of Dams records 92,071 small to large dams across the country as of 2021. We located two databases documenting dam removals in the United States. The United States Geological Survey Dam Removal Information Portal (DRIP), details 866 removals since 2010.[11]In contrast, the American Rivers' Dam Removal database details 882 removals.[12] The reason for the discrepancy appears to be partly due to how recently the records have been updated, with DRIP listing the last removal in 2019, and American Rivers' in 2020.

DRIP provides a Dam Removal Science Database, which is 'the result of an extensive literature search aimed at identifying documents relevant to the emerging field of dam removal science'[13]. The Science Database provides a large amount of information on 207 dam removal projects in both the US and internationally.

Habel et al. undertook a study assessing the complexity of dam and reservoir removal projects. They found that of all the dam removal records in the American River's database, only 30% have a reason listed for the removal.[14] These include safety, liability and restoration.

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[8] Duda and Bellmore.

[9] Duda and Bellmore.

[10] Duda and Bellmore.

[11] Jeff Duda et al., 'USGS Dam Removal Science Database v4.0' (U.S. Geological Survey, 2018).

[12] 'American Rivers Dam Removal Database' (figshare, 19 February 2019).

[13] Duda et al., 'USGS Dam Removal Science Database v4.0'.

[14] Habel et al., 'Dam and Reservoir Removal Projects: A Mix of Social-Ecological Trends and Cost-Cutting Attitudes'.

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Despite the large number of dam removals in the US, there are limited studies assessing ecosystem changes following removal and the final impact on the potential for restoration.[15]

> For 1,100 dams removed before 2016 in the US, only 130 of these removals had any ecological or geomorphic assessments, and less than half of those included before-removal and after-removal studies.[16]

Europe

In Europe, the lack of a uniform inventory and monitoring system for dams creates difficulties in creating an overall picture.[17] The AMBER European Barrier Atlas database currently has records of 61,521 dams in 36 European countries. Habel et al. used data from Dam Removal Europe (DRE), in combination with data collected from a number of governmental institutions, to carry out an analysis of dam removals. Their analysis revealed that between 1996–2019, a total of 342 objects were dismantled, with approximately 95% of these being low barriers (up to 7.5m high), while only one removed dam (discussed in the select case studies below) comprised a wall height that exceeded 30m. The study noted some limitations, such as data on dam height, removal date, and lack of information in specific countries.[18] The study identified the following reasons for dam removal in select countries:

- UK – Safety was the main reason for dam removal/decommissioning, with other factors including ecosystem recovery and channel restoration. Noting, ecosystem services are highly important when considering reasons for removal/decommission.
- Sweden – Safety, law and policy, economy and ecology were major reasons for removal.
- Norway – Seen as similar to Sweden, however the reasoning for removal/decommissioning was only available for around one-third of registered cases. Noting:

  > Several considerations are made as the dams are removed, i.e. effects on biodiversity, the public's use of structures, hydrology, and the cultural heritage associated with the structures. However, whether this is for the purpose of environmental consideration or for securing better public use of the area is not stated clearly in most cases.[19]

- France – A number of early dam removal operations between 1996-1998 'shared common features: poor technical condition, advanced age of the structures, and positive prognosis for rebuilding fish migration'.[20]
- Poland – The database used did not contain any data on removed dams. Noting that the Wilkówka dam scheduled for removal in 2020 was damaged by a flood due to constructional defect.
- Russia – Found that no dams larger than 10m had ever been removed within Russia.[21]

[15] Habel et al.
[16] Habel et al.
[17] Habel et al.; Quirin Schiermeier, 'Europe Is Demolishing Its Dams to Restore Ecosystems', *Nature* 557, no. 7705 (16 May 2018): 290–91.
[18] Habel et al., 'Dam and Reservoir Removal Projects: A Mix of Social-Ecological Trends and Cost-Cutting Attitudes'.
[19] Habel et al.
[20] Habel et al.
[21] Habel et al.

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Case studies: Recent removals of large dams

Klamath River Dams

The Klamath River Renewal project is an on-going project in the US aiming to simultaneously remove four dams originally constructed as part of a hydroelectricity scheme on both sides of the Oregon-California state border: JC Boyle, Copco No. 1 & No. 2, and Iron Gate. The combined height of the dams totals 125m and once completed the project will be the largest dam removal in the history of the US.[22] The reasoning behind the push to remove the dams is to restore natural river processes, primarily to revive what once was the third largest salmon migration in the US (only 1% to 3% of historical salmon are estimated to be left in the basin) and to significantly improve water quality to reduce disease in fish.[23]

While the push to remove the dams has been going on for a number of decades, it escalated in 2001 when 'the federal government cut water deliveries to farms to protect endangered fish', resulting in nearly 70,000 adult salmon dying and a 'major loss of juvenile salmon productivity' the following year.[24] It is broadly agreed that restoration of salmon migration in the Klamath Basin will not only benefit the basin ecosystem but virtually every sector that relies on it including agriculture, tribes, tourism, recreation, conservation interests, and recreational and commercial fishermen.[25]

In November 2020, the Klamath River Renewal Corporation submitted its Definite Decommissioning Plan (DDP) for the Lower Klamath Project to the Federal Energy Regulatory Commission. The DDP provides extensive detail on the project design, deconstruction, and post-deconstruction restoration activities for the removal.[26] In November 2020, the BBC reported that the project would cost around US$450 million[27] and dam removal is currently anticipated to begin in early 2023.[28]

Elwha and Glines Canyon dams

In 1995, the US Department of the Interior released the Final Programmatic Environmental Impact Statement, finding that the Elwha and Glines Canyon hydroelectric dams had severely degraded the Elwha River ecosystem and the local salmon population. As such, they proposed that both dams be removed to 'fully restore the Elwha River ecosystem and native anadromous fisheries'.[29] The restoration would also provide the opportunity for native peoples to renew tribal culture, age-old traditions and would uncover previously submerged sacred sites.[30]

In 2010, a US$26.9 million contract was awarded to remove the dams and the US National Park Service (NPS) estimated the entire Elwha River Restoration project would cost approximately US$324.7 million. This total cost included the purchase of the two dams and hydroelectric plants, construction of two water treatment plants and other facilities to protect water users,

[22] Alexander Matthews, 'The Largest Dam-Removal in US History', accessed 1 February 2022.

[23] Klamath River Renewal Corporation, 'The Project'; Isabella Vanderheiden, 'Klamath Dam Removal on Track to Begin Early 2023', *Times-Standard* (blog), 13 November 2021; Matthews, 'The Largest Dam-Removal in US History'.

[24] Klamath River Renewal Corporation, 'The Project'.

[25] Klamath River Renewal Corporation.

[26] Klamath River Renewal Corporation.

[27] Matthews, 'The Largest Dam-Removal in US History'.

[28] Vanderheiden, 'Klamath Dam Removal on Track to Begin Early 2023'.

[29] Traci E Hahn, 'Final Environmental Impact Statement', 1995, 215; 'Elwha and Glines Canyon Dams', American Rivers, accessed 2 February 2022.

[30] Water Technology, 'World's Biggest Dam Removal and Restoration Project'.

construction of flood protection facilities, a fish hatchery, and a greenhouse to propagate native plants for revegetation.[31]

In 2011, the project to remove the Elwha (32m) and Glines Canyon (64m) dams on the Elwha River in Washington began, with the final structure removed in 2014.[32] At the time the project was the 'second largest ecosystem restoration project in the American National Park System'.[33]

Each dam was removed in stages in an effort to manage sediment loads and prevent damage to the river ecosystem downstream.[34] Due to their unique structural requirements, each dam was removed with a different method, as outlined below:

Glines Canyon Dam:

> First, water levels in the Lake Mills reservoir were lowered to the bottom of the spillway gates. Using barge-mounted hydraulic hammers, the first 17 feet of the dam have been removed down to the waterline.
>
> The next 173 feet of the dam were removed using a notching process. The dam was "notched down" on alternating sides, creating temporary spillways used to further drain the reservoirs. The headgate house, penstock and powerhouse were removed during windows of halted deconstruction to allow sediment loads to decrease downstream.
>
> As layers of the dam were removed the reservoir drained through each new notch. Notches were sized on a case-by-case basis depending on the flows required to maintain or lower the reservoir level. Notching occurred on alternating sides of the dam until the sediments from the upstream delta eroded downstream and were resting against the dam.
>
> At this point, the remaining portion of the dam was removed and the river channel restored.[35]

Elwha Dam:

> The first step in removing the Elwha dam was to lower the reservoir's water level by using the existing water intakes and spillways approximately 15 feet. This process began on June 1, 2011 following the closure of the powerhouse.
>
> A temporary diversion channel was then excavated through the left spillway to allow Lake Aldwell to be further drained.
>
> Cofferdams -- temporary structures acting as dams -- will then be installed to direct reservoir outflow into the temporary diversion channel. This allowed the remaining water immediately behind the concrete dam to be pumped out and the fill material behind the dam to be removed under dry conditions.
>
> The concrete dam was then removed and the original river channel restored.
>
> The powerhouse and all other structures were removed and the temporary diversion channel refilled.

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[31] U.S. National Park Service, 'Elwha River Restoration Frequently Asked Questions', accessed 2 February 2022.

[32] 'Elwha and Glines Canyon Dams'; Seattle Times staff, 'Olympic Park's Elwha River Freed after Last Dam Blasted out', The Seattle Times, 27 August 2014; U.S. National Park Service, 'Dam Removal [Web Archive]', 3 July 2019.

[33] Water Technology, 'World's Biggest Dam Removal and Restoration Project'.

[34] Water Technology.

[35] U.S. National Park Service, 'Dam Removal [Web Archive]'.

Finally, the site was re-contoured and revegetated to most closely resemble the pre-dam condition.[36]

Post dam removal monitoring

Scientists have been monitoring the Elwha River system after the removal of both dams. While biologists predicted it could take 'a generation – if not more – to recover', a number of changes have been reported.[37] There have been a number of reports from the NPS, American Rivers and other news sources on the recovery of the Elwha River system:

- Immediately following the dam removals, a significant revegetation plan was initiated on the former lake beds, with over 300,000 plants and thousands of seeds planted.[38]
- In the two years following the removals, researchers identified several wildlife species expanding their distributions into the restored terrestrial and wetland habitats.[39]
- A number of salmon and trout species showed strong signs of recovery, while other populations remained critically low.[40]
- After decades of significant erosion of the shoreline of the river delta, the river mouth delta landform expanded by over 400m due to the deposit of sediment previously trapped behind the dams. This new habitat was quickly inhabited by a diverse range of species, such as sardines, anchovies, Dungeness crab and shrimp.[41]
- Studies indicated that physical changes to the river delta and estuary habitats 'reduced the abundance of macroinvertebrates and fish in the estuary and shifted community composition from brackish to freshwater-dominated species'.[42]

The NPS also lists a number of research publications regarding the Elwha River restoration.

Lower Eklutna dam

The Lower Eklutna dam removal is a unique case. The Eklunta River and Lake fall within Chugach State Park in Alaska. Built in 1928 as part of Alaska's first hydroelectric project, the dam was abandoned in 1955 when the Eklutna Power Project (now the Eklutna Hydroelectric Project) came online upriver, with a dam at Eklutna Lake diverting the river out of its natural valley.[43] The Native Village of Eklutna pushed for the dam's removal to restore the salmon migration and the natural ecology of the river; this was supported by repeated studies over several decades recommending the removal of the dam as essential for restoration.[44]

The process to start returning the river's flow began in 2015, with the Native Village of Eklutna and Eklutna Native Corp. joining with the non-profit Conservation Fund.[45] Removal of the dam itself

[36] U.S. National Park Service.

[37] National Park Service, 'Restoration and Current Research', accessed 3 February 2022.

[38] National Park Service; Tara Lohan, 'The Elwha's Living Laboratory: Lessons From the World's Largest Dam-Removal Project • The Revelator', *The Revelator* (blog), 1 October 2018.

[39] National Park Service, 'Restoration and Current Research'; Lohan, 'The Elwha's Living Laboratory'; 'Elwha and Glines Canyon Dams'.

[40] National Park Service, 'Restoration and Current Research'; Lohan, 'The Elwha's Living Laboratory'; 'Elwha and Glines Canyon Dams'.

[41] National Park Service, 'Restoration and Current Research'; Lohan, 'The Elwha's Living Laboratory'; 'Elwha and Glines Canyon Dams'.

[42] National Park Service, 'Restoration and Current Research'.

[43] Eklutna River Restoration Coalition, 'Eklutna Dam Removal'; Cook Inlet Tribal Council, 'Water Returns to Eklutna'; The Alaska Center, 'Eklutna Dam Removal: Restore the River', *The Alaska Center* (blog), accessed 3 February 2022,; The Conservation Fund, 'Demolishing a Deadbeat Dam in Alaska', The Conservation Fund, accessed 8 February 2022.

[44] Cook Inlet Tribal Council, 'Water Returns to Eklutna'; Eklutna River Restoration Coalition, 'Eklutna Dam Removal'; Naomi Klouda, 'Work Begins Tearing down 1920s-Era Eklutna River Dam', n.d., 3; The Conservation Fund, 'Demolishing a Deadbeat Dam in Alaska'.

[45] Matt Tunseth, 'For 89 Years, a Dam Blocked Salmon on the Eklutna River. It's Finally Gone.', Anchorage Daily News, 25 August 2018.

began in 2017[46] and was completed in 2018.[47] At the time the project was said to have been 'the fastest and most efficient major dam removal effort ever completed in the country'.[48] The removal cost US$7.5 million and was funded by Conservation Fund with the support of the landowner Eklutna Inc.[49]

While the dam was successfully removed, there is still a major barrier preventing the river from running and returning to its natural state. The Eklutna Hydroelectric Project still diverts water away from the river[50], resulting in the river remaining 'but a shadow of its former self'.[51] In November 2021, as part of a study to 'determine a course of action to address the project's impact to fish and wildlife', water was released from the dam at Eklutna Lake for a period of three weeks.[52] Though temporary, the release was seen as a success, transporting sediment downstream that had been stockpiled by the old dam, salmon habitat reappeared, and no impact to downstream infrastructure was observed. Further studies are due to be conducted by the dam's owners.[53]

Vezins and La Roche qui Boit dams

The Vezins and La Roche qui Boit dams on the Sélune River were scheduled to be removed by the French Government in 2017. The Sélune River flows directly into the bay of Mont-Saint-Michel, a UNESCO world heritage site. The La Roche qui Boit dam falls within the buffer zone of the UNESCO site and within Ramsar site no. 709 (a wetland site of international importance), while the Vezins dam does not. According to UNSECO's Operational Guidelines for the Implementation of the World Heritage Convention a buffer zone is described as:

> an area surrounding the nominated property which has complementary legal and/or customary restrictions placed on its use and development to give an added layer of protection to the property.[54]

The project began in 2009 when the French government deciding not to renew the license of the two hydroelectric dams.[55] In 2012 a collaborative research program between approximately 100 scientists from 20 different research laboratories was initiated to monitor various aspects of the dam removal projects, split into three stages[56]:

1. 2012 – 2018: the pre-removal phase (preliminary assessments and evaluation of reservoir draining).
2. 2019 – 2022: the removal phase (direct assessment of the removal and anticipation of the changes that may occur).
3. 2022 – 2027: the post-removal phase (ecological restoration).[57]

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[46] Tunseth.

[47] The Conservation Fund, 'Removal Of Alaska's Eklutna Dam Complete', The Conservation Fund, 6 September 2018.

[48] The Conservation Fund.

[49] Tunseth, 'For 89 Years, a Dam Blocked Salmon on the Eklutna River. It's Finally Gone.'; The Conservation Fund, 'Removal Of Alaska's Eklutna Dam Complete'.

[50] Tunseth, 'For 89 Years, a Dam Blocked Salmon on the Eklutna River. It's Finally Gone.'; Nathaniel Herz, 'A Year after a Dam Was Removed, This River near Anchorage Is Still Waiting for Water', *Alaska Public Media* (blog), 11 September 2019.

[51] Tunseth, 'For 89 Years, a Dam Blocked Salmon on the Eklutna River. It's Finally Gone.'

[52] Aaron Leggett et al., 'Returning Salmon to the Eklutna River', Anchorage Daily News, 28 November 2021.

[53] Leggett et al.

[54] United Nations Educational, Scientific and Cultural Organization, 'Operational Guidelines for the Implementation of the World Heritage Convention' (Paris: Intergovernmental Committee for the Protection of the World Cultural and Natural Heritage, 10 July 2019), 30.

[55] Dam Removal Europe, 'Sélune River Dams, Normandy, France'.

[56] Dam Removal Europe; National Research Institute for Agriculture, Food and Environment, 'Program Schedule', Selune, accessed 4 February 2022.

[57] Dam Removal Europe, 'Sélune River Dams, Normandy, France'.

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The program, which will run until 2027 covers three key areas, each aiming to answer a number of questions.[58]

The dynamics of the territory and its trajectories:

- How do inhabitants, valley, river and lake users see the ecological restoration project of the Sélune River?
- Which criteria are decisive for its success?
- Which changes can be expected for agriculture and landscapes? [59]

River dynamics and water quality

- What impact will dismantling the dams have on water, sediments, and chemical flows?
- Will the Sélune River's geomorphology and shape change? [60]

Biocenosis, their functioning and evolution

- What is the impact of the dams removal on river and riverbank ecosystems?
- How will plant, animal, aquatic and terrestrial life reorganize?[61]

The dams were scheduled to be removed for a number of reasons including to restore ecological function of the river, to restore Atlantic salmon and other migratory species populations, and to improve water quality and sediment movement, while also filling obligations under the Water Framework Directive.[62] The removal of the Vezins dam was completed in 2020, making it the largest dam (36m) to be removed in Europe.[63] An Update by Dam Removal Europe in early 2021, showed vegetation gradually recolonising the new river banks.[64] The La Roche qui Boit dam removal is currently scheduled for completion by the end of 2022.[65]

Yecla de Yeltes

The Yecla de Yeltes dam on the Huebra River in Spain, fell within a Special Protected Area for birds and a Site for Community Importance[66], both of which are part of the Natura 2000 network, 'a network of core breeding and resting sites for rare and threatened species, and some rare natural habitat types'.[67]

When the water rights for the dam expired, the Duero River Basin Authority (Confederación Hidrográfica del Duero, CHD) decided to remove the dam to avoid maintenance costs and to improve the ecological state of the river. The CHD is responsible for the water and water related infrastructure management of the Spanish Duero Basin.[68] Ecologists had suspected that the dam

[58] National Research Institute for Agriculture, Food and Environment, 'Program Schedule'.

[59] National Research Institute for Agriculture, Food and Environment.

[60] National Research Institute for Agriculture, Food and Environment.

[61] National Research Institute for Agriculture, Food and Environment.

[62] Dam Removal Europe, 'Sélune River Dams, Normandy, France'; World Wide Fund For Nature (WWF), 'Biggest Dam Removal in European History', accessed 4 February 2022.

[63] Dam Removal Europe, 'Sélune River Dams, Normandy, France'; World Wide Fund For Nature (WWF), 'Biggest Dam Removal in European History'.

[64] Dam Removal Europe, 'Sélune River Dams, Normandy, France'.

[65] European Rivers Network, 'Removal of Two Large Dams (Vezins Et Roche Qui Boit) to Free the Sélune River!', *European Rivers Network* (blog), 6 February 2018; The Nature Conservancy, 'Vezins Dam Removal, Sélune River, France', The Nature Conservancy, accessed 4 February 2022; Dam Removal Europe, 'Sélune River Dams, Normandy, France'.

[66] Dam Removal Europe, 'Yecla de Yeltes Dam, Spain', *Dam Removal Europe* (blog), accessed 4 February 2022.

[67] European Commission, 'Natura 2000', accessed 4 February 2022.

[68] Dam Removal Europe, 'Yecla de Yeltes Dam, Spain'.

was partly responsible for the observed decline of several endemic species including a small freshwater fish called the sarda, otters and black storks.[69]

In 2018, the project to remove the dam began and was completed in the same year.[70] As reported by Nature, scientists aimed to monitor the return of species to the river.[71] The LIFE + CIPRIBER project appears to have monitored species in the Huebra River after the dam removal[72], however it is important to note that project covers a number of large areas across Spain and the final report is only available in Spanish.

[69] Schiermeier, 'Europe Is Demolishing Its Dams to Restore Ecosystems'.

[70] Dam Removal Europe, 'Yecla de Yeltes Dam, Spain'.

[71] Schiermeier, 'Europe Is Demolishing Its Dams to Restore Ecosystems'.

[72] Dam Removal Europe, 'Yecla de Yeltes Dam, Spain'.