



River continuity in Europe

from **Broken Rivers** to **Free-Flowing Rivers**

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& the AMBER consortium



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Europe's Freshwater Fishes and the Biodiversity Strategy Targets
24-25 November 2022 – Brussels

Europe has some of the most endangered freshwater fish in the world...

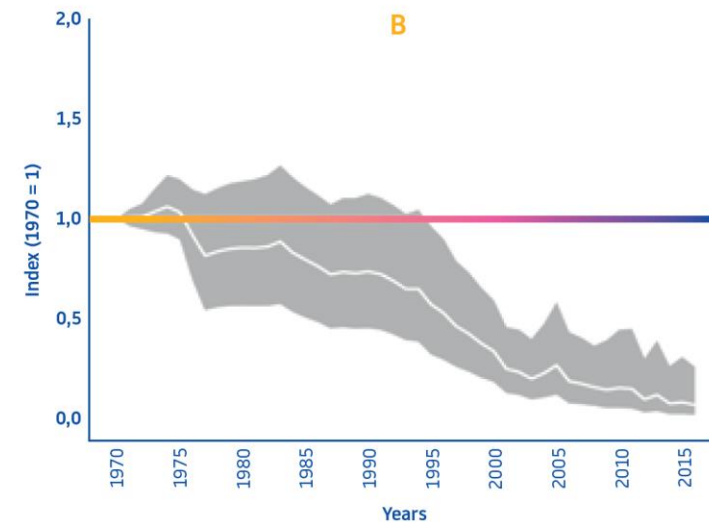
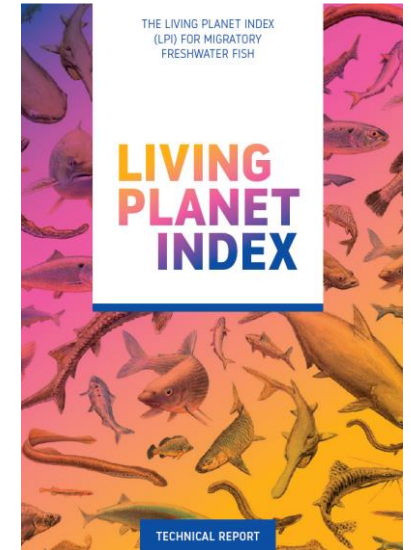
Terrestrial mammals -25%

Marine fish -20%

Freshwater fish -65%

Freshwater migratory fish -76%

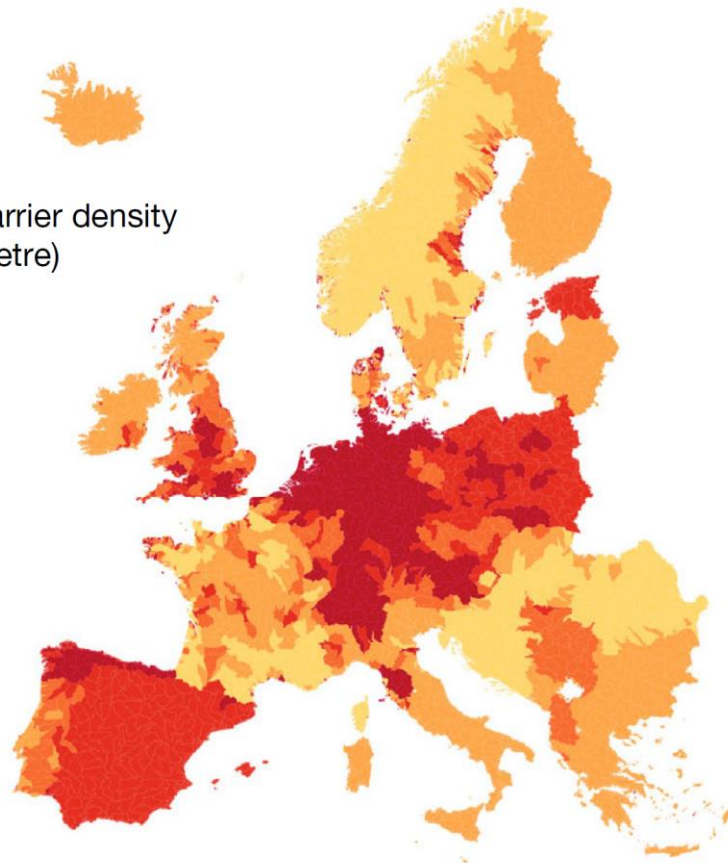
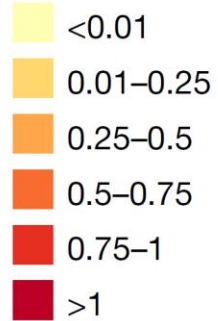
FW migratory fish in Europe -93%



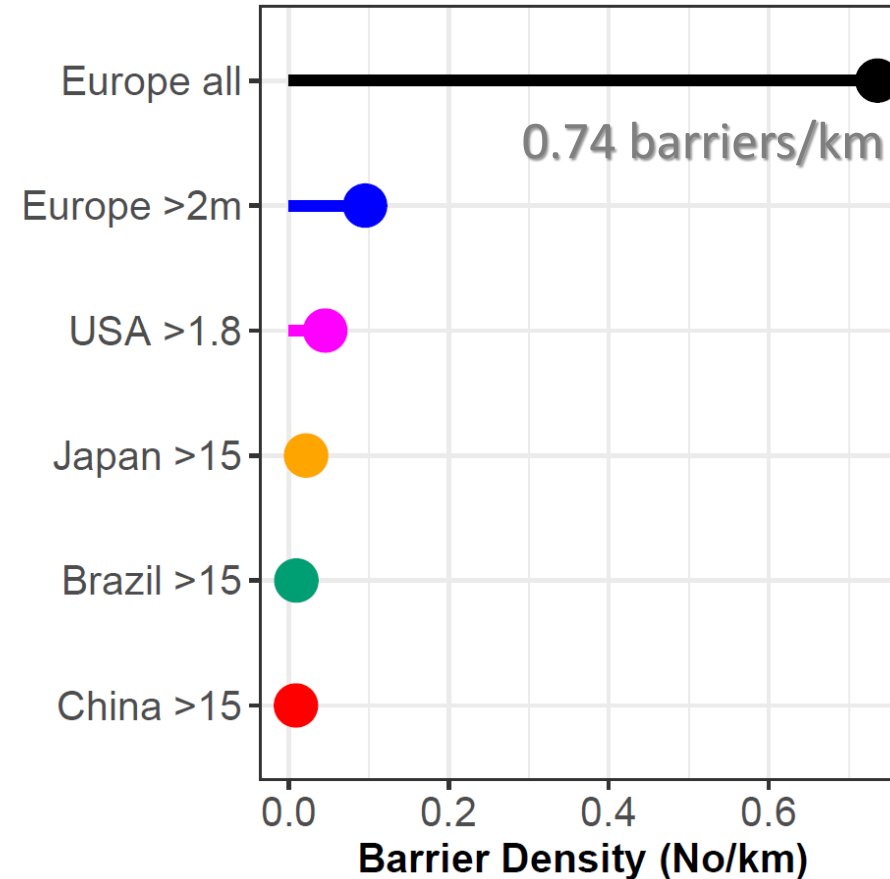
..probably because it has some of the most fragmented rivers.....

b

Field-estimated barrier density
(barriers per kilometre)



+1.2M barriers



Belletti et al (2020) *Nature*

We have been abstracting water for milenia...

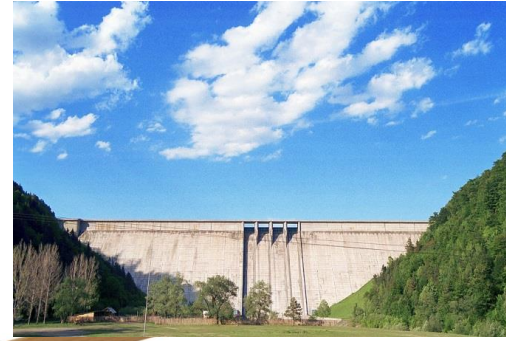


Roman Aqueduct (Segovia, Spain)

99.9%



0.1%



dams are NOT our biggest problem....

In rivers [H] extinction is spelled with

H

Barriers



Habitat loss



Habitat degradation



Harvesting



[H]invasive sp



Heat

**In rivers [H] extinction is spelled with
...but so is**



7 reasons to be cheerful

The biggest problem
is not what we don't
know, but what we
*don't know we don't
know*



Donald Rumsfeld
US Secretary of Defense

[the *unknown unknowns*]

1

We know
more...

(including key
unknowns)

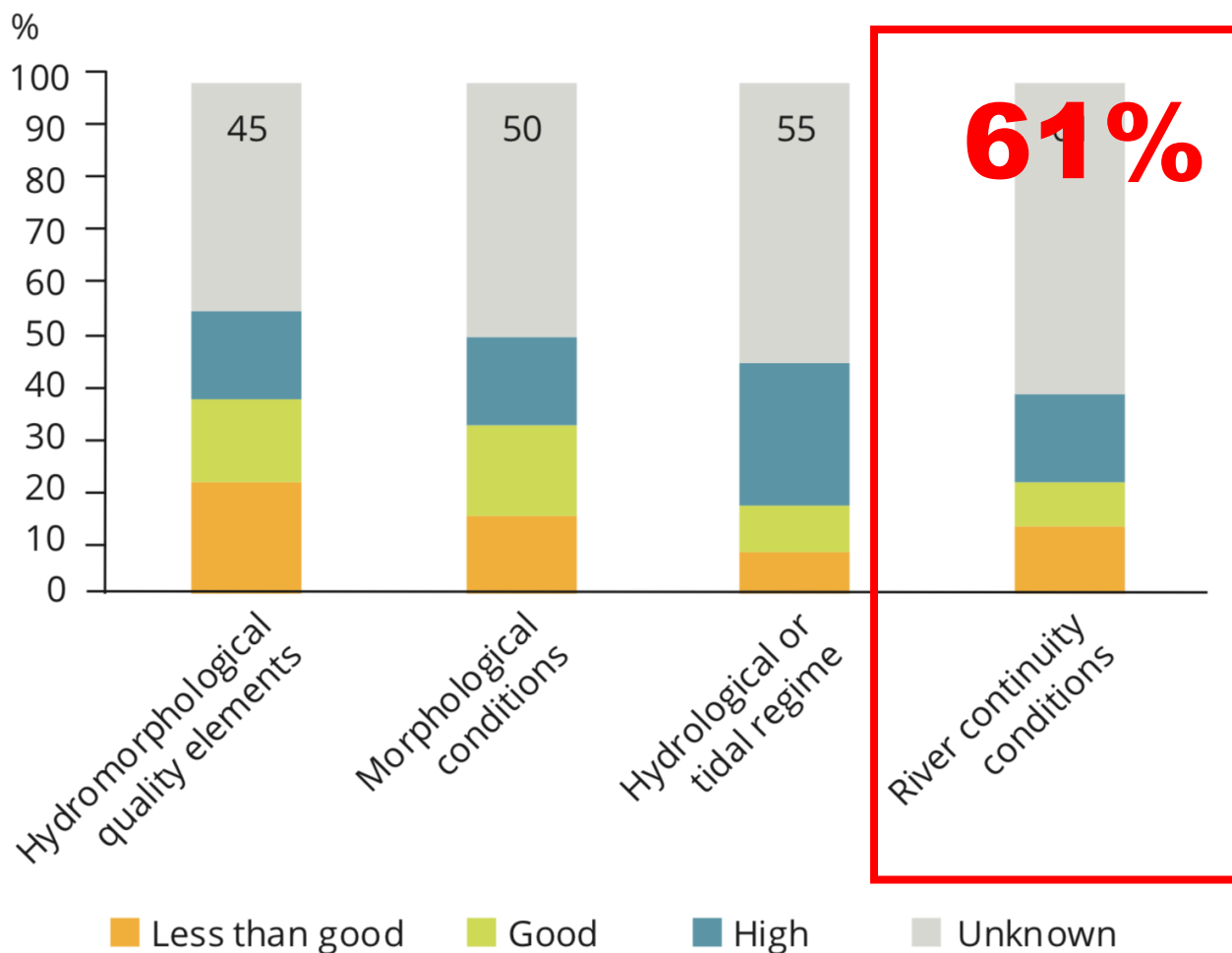


River Continuity conditions

2018

unknown

e) Rivers



European Environment Agency [DK] | <https://www.eea.europa.eu/data-and-maps>

Fragmentation of river systems

Indicator Specification — Indicator codes: SEBI 014 — expired — Created 26 Feb 2007 — Published 21 May 2010 — Last modified 21 Oct 2016 — 8 min read



Topics: Biodiversity — Ecosystems



This page was **archived** on 21 Oct 2016 with reason: Content is outdated

The indicator shows in spatial and quantitative terms, fragmentation due to the presence of artificial structures that a) may affect the passage of migratory fish and so restrict their range and/or abundance and b) changes substantially the natural habitat distribution within rivers and modify their ecological capacity. It thus describes the difference between the potential range and actual range of migratory fish in river systems due to artificial obstacles on the one hand and the change in habitats on the other hand.



The data sets for the indicator are still under construction.

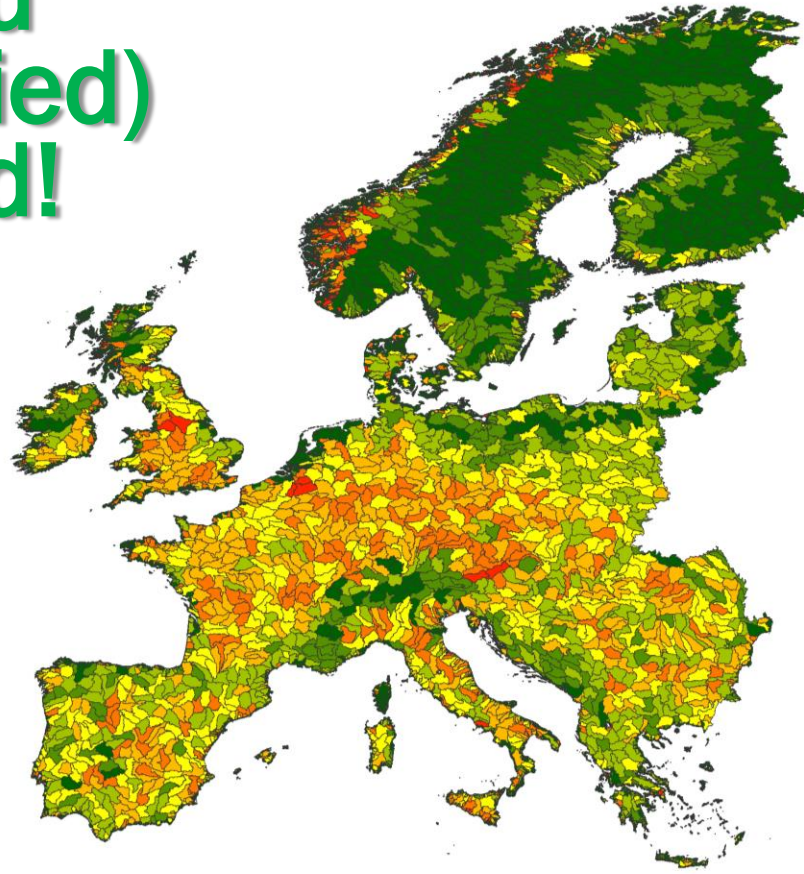
EEA (2018). European waters - Assessment of pressures and status. EEA Report 7/2018 ISSN 1977-8449

The first Barrier Atlas of Europe

2020

Most fragmented
(but also best studied)
rivers in the world!

+1.2M
barriers

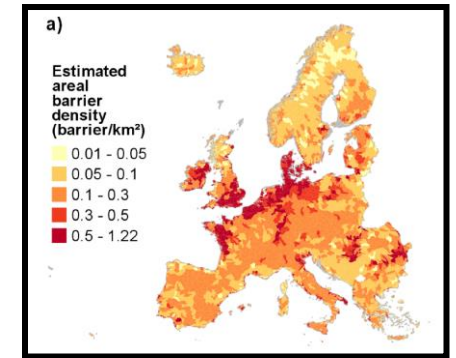


700K
database
600K
missing!



Belletti et al (2020) *Nature*

Drivers of river fragmentation



Belletti et al (2020)

Agriculture

CLC2 agricultural areas (%)

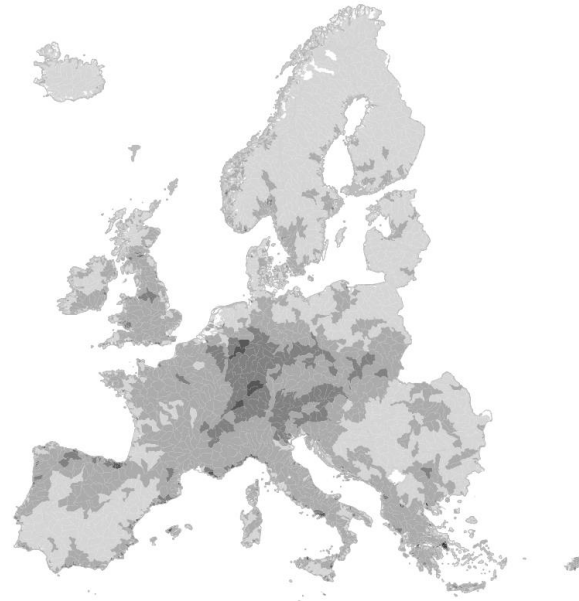
- 0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1



Roads

Road crossings density (No./km²)

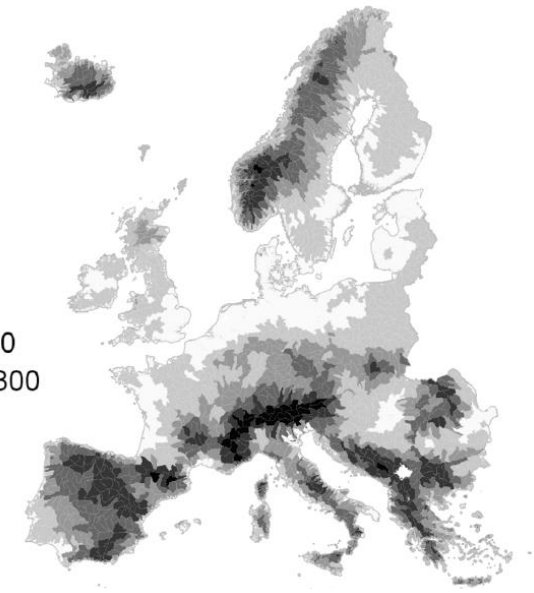
- 0
- 0 - 0.1
- 0.1 - 0.4
- 0.4 - 0.8
- 0.8 - 1.4
- 1.4 - 6.0
- 6 - 10.2



Altitude

Mean altitude (m.a.s.l)

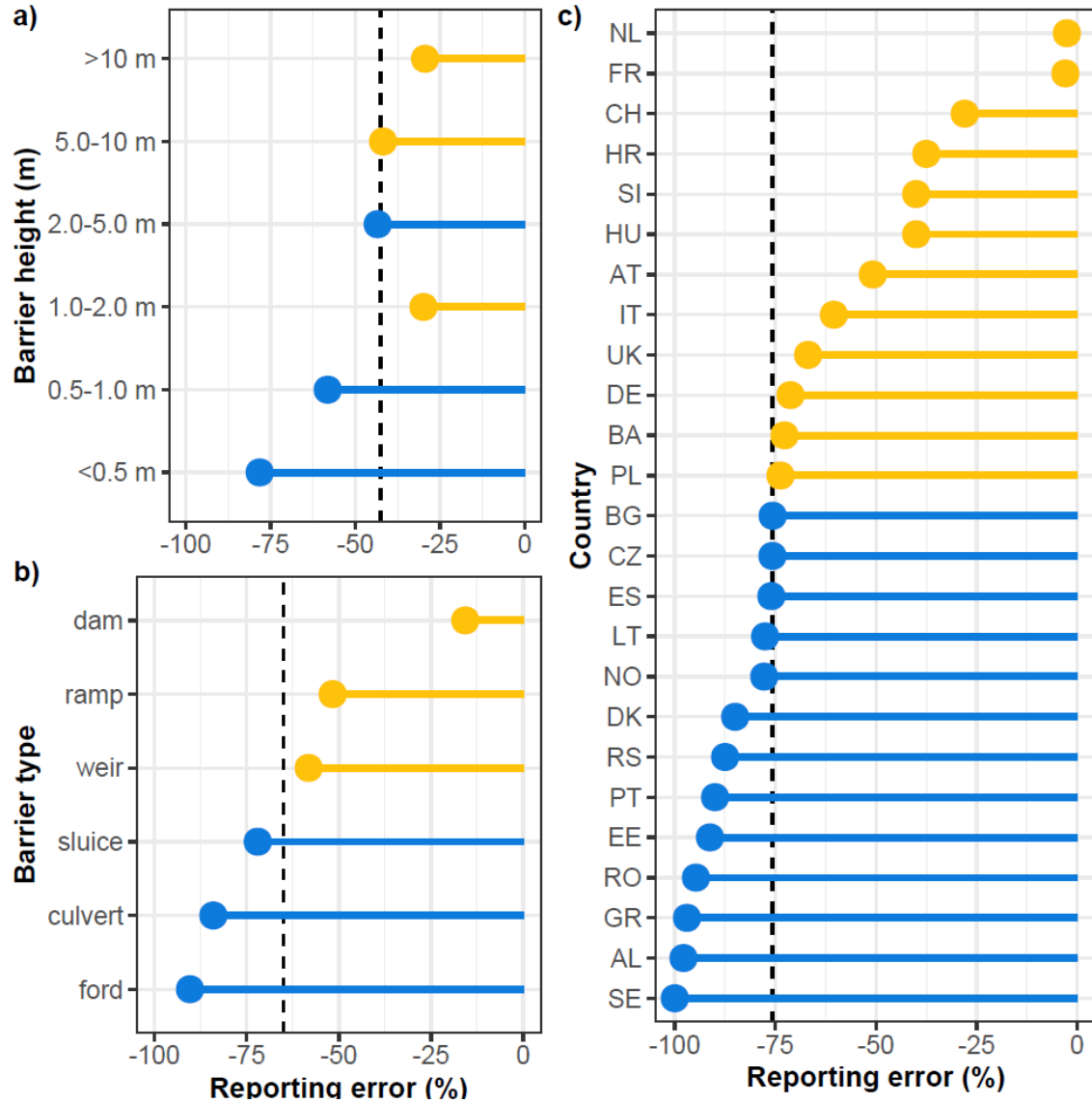
- 5 - 100
- 100 - 300
- 300 - 500
- 500 - 800
- 800 - 1,300
- 1,300 - 2,300



Fragmentation largely mirrors other anthropogenic pressures on rivers

The known unknowns...

Belletti et al (2020) *Nature*

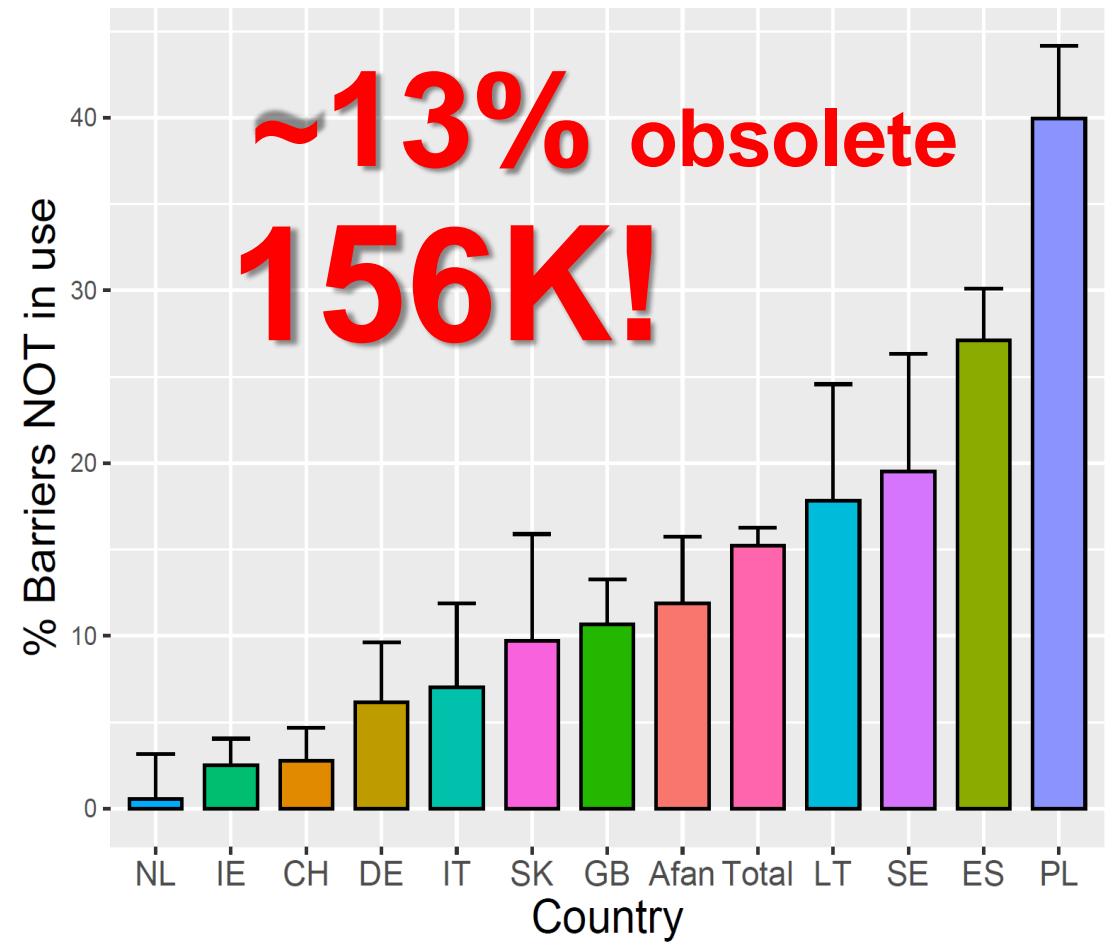
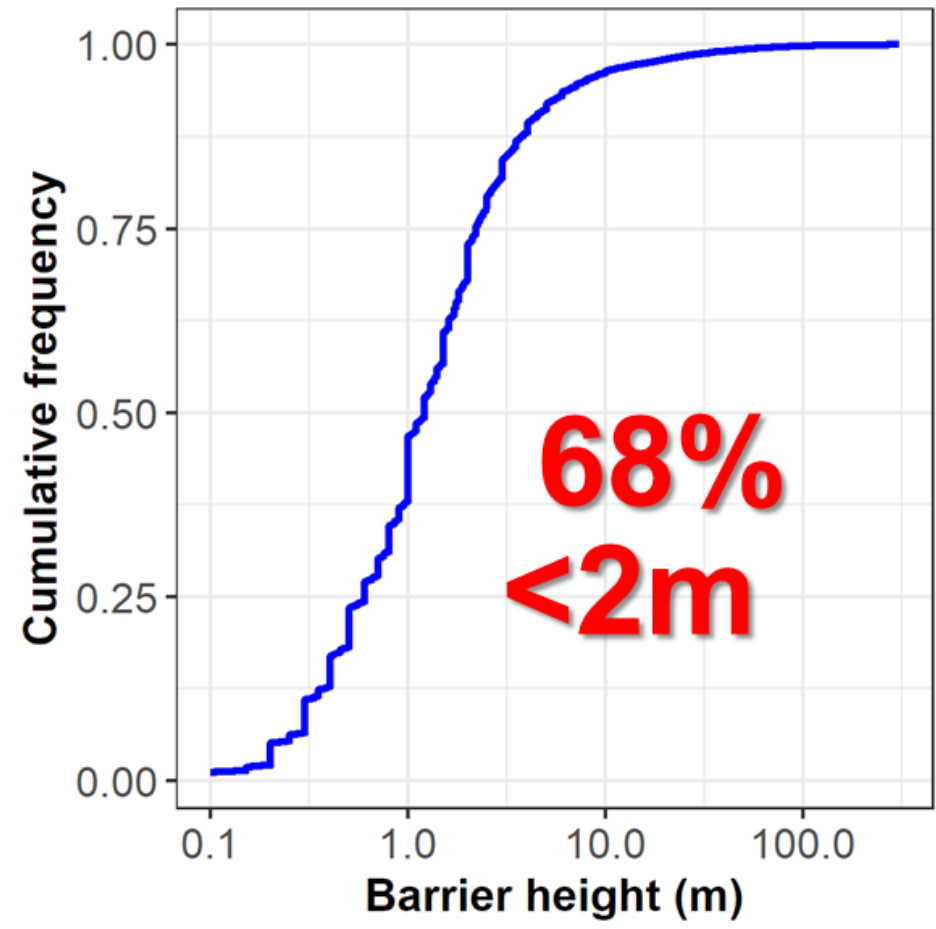


...we know *where* most of the missing barriers are

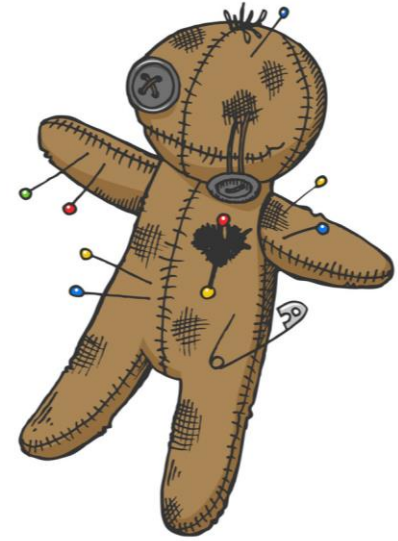
....and also *what type* they are

2

Most barriers are small, many obsolete

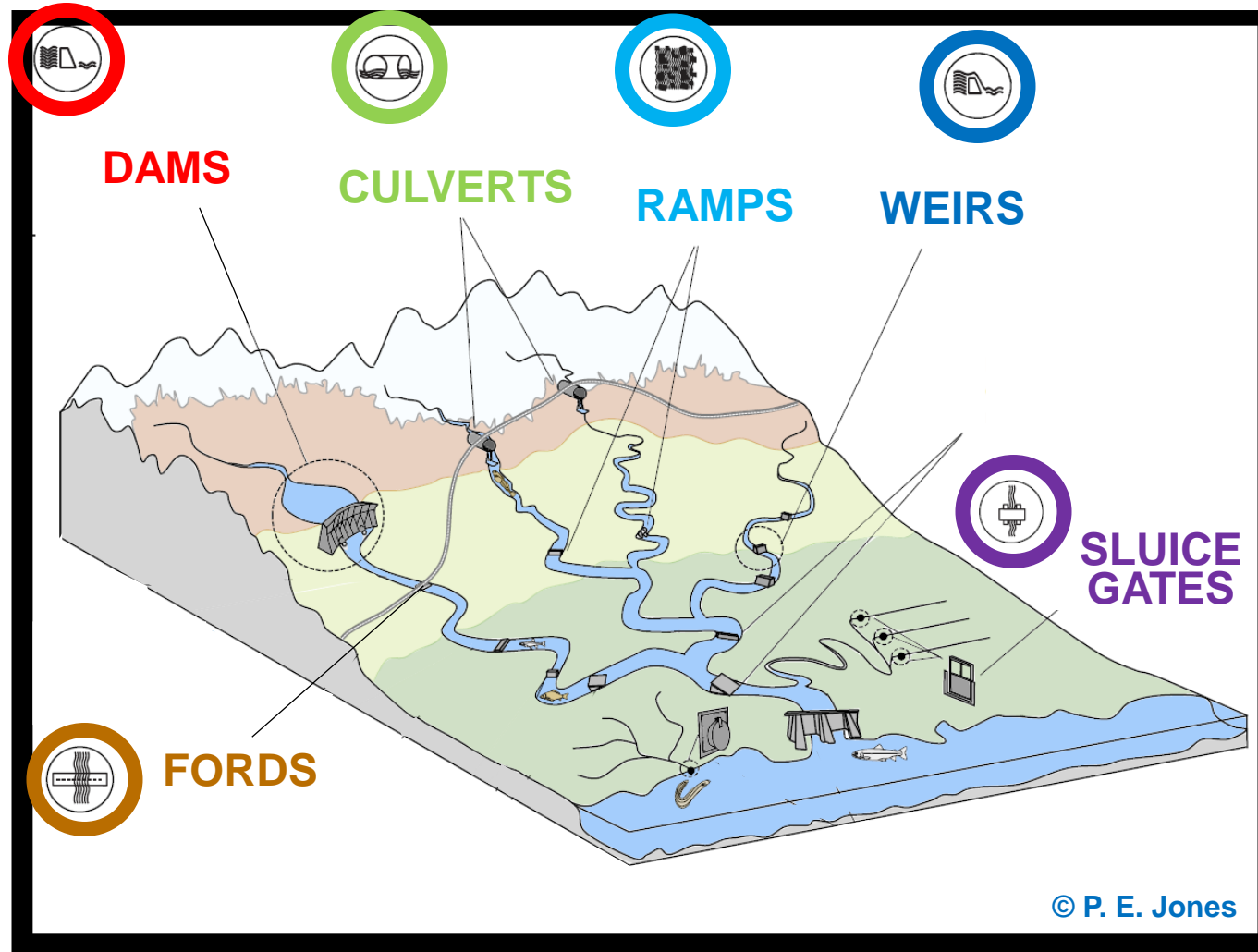


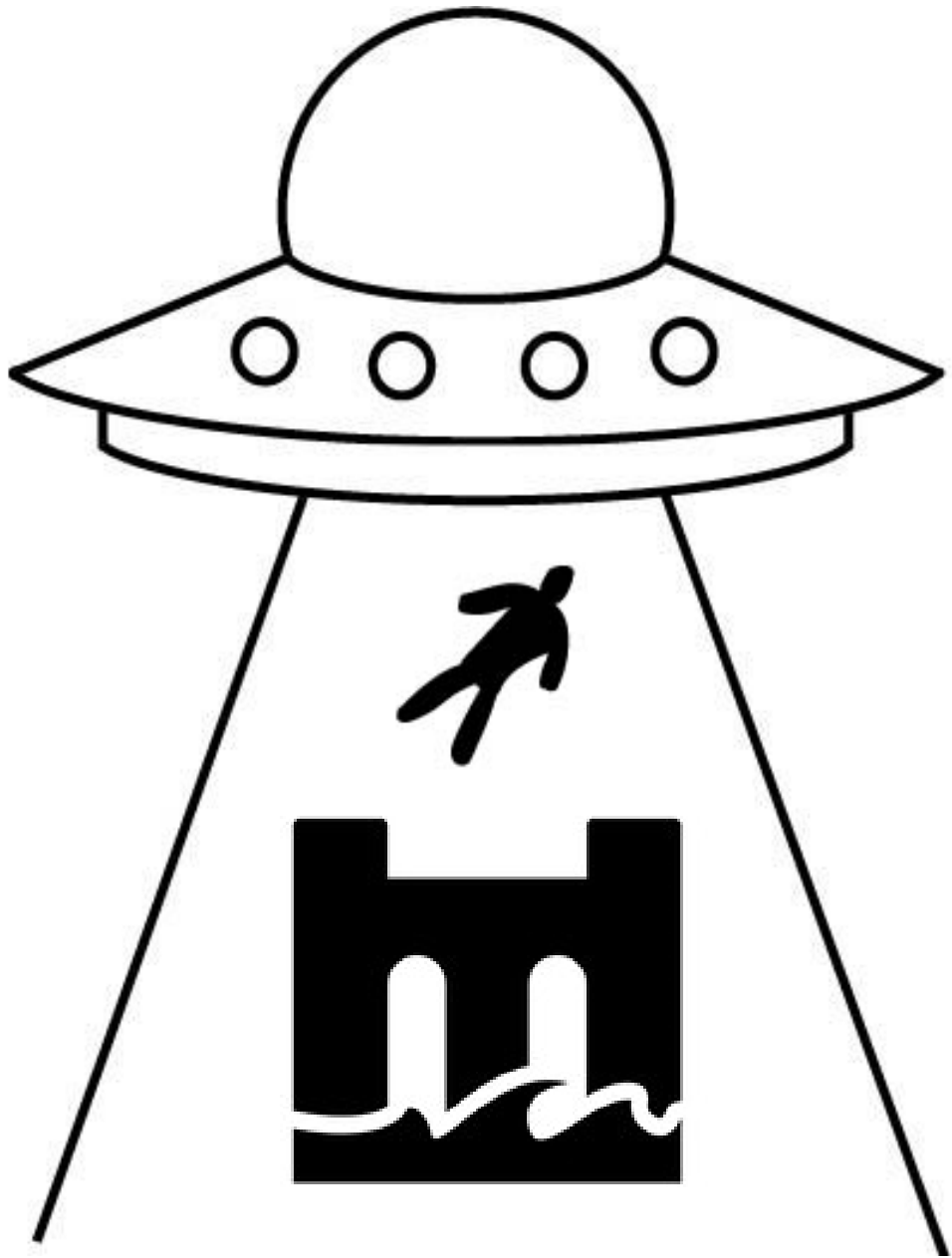
Death by a thousand cuts



Large dams get the attention....,

Small (unreported) barriers do most of the damage





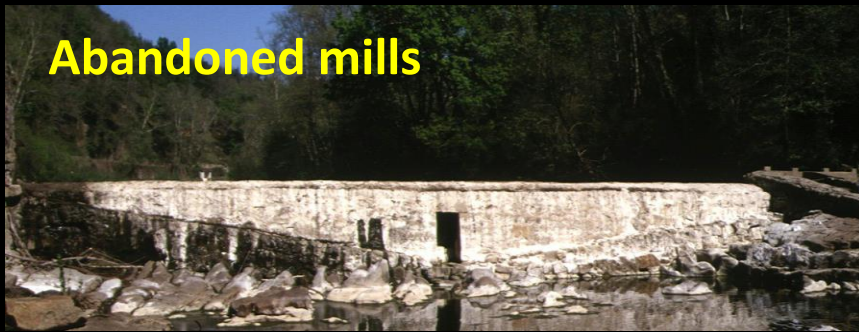
U nwanted

F luvia l

O bjects

3

We know who the worst UFOs are...



4

...this offers unprecedented opportunities for restoration

STOP fragmenting



Reconnecting




Targeting small UFOs is cheaper & socially more acceptable

5

...we now have the legal instruments

Restore and protect




The **2030 Biodiversity Strategy** builds upon and goes beyond the existing EU Birds and Habitats Directives and the EU Natura 2000 Network of protected areas.

IT SETS AMBITIOUS EU TARGETS AND COMMITMENTS FOR 2030 TO ACHIEVE HEALTHY AND RESILIENT ECOSYSTEMS, FOR EXAMPLE:

- TURN AT LEAST 30% OF EU'S LAND AND 30% OF SEAS INTO EFFECTIVELY MANAGED AND COHERENT PROTECTED AREAS
- RESTORE DEGRADED ECOSYSTEMS AND STOP ANY FURTHER DAMAGE TO NATURE
- RESTORE AT LEAST 25 000 KM OF THE EU'S RIVERS TO BE FREE-FLOWING
- REDUCE THE USE AND RISK OF PESTICIDES BY AT LEAST 50%
- TACKLE BYCATCH AND SEABED DAMAGE
- PLANT OVER 3 BILLION DIVERSE, BIODIVERSITY RICH TREES
- 25% OF AGRICULTURAL LAND UNDER ORGANIC FARMING, AND PROMOTE THE UPTAKE OF AGRO-ECOLOGICAL PRACTICES
- ESTABLISH BIODIVERSITY-RICH LANDSCAPE FEATURES ON AT LEAST 10% OF FARMLAND
- REVERSE THE DECLINE OF POLLINATORS

This **transformational systemic change** will engage all parts and sectors of European society and the economy. At least **EUR 20 billion a year** will be unlocked for nature, encouraging businesses, public authorities, cities and local authorities to include biodiversity concerns in their decision-making.



Restore at least **25 000 km** of EU's rivers to be free-flowing by 2030



Biodiversity Strategy 2030

Barrier Removal for River Restoration



European Commission
December 2021

6

Barrier removal is becoming mainstream

6,762

**Dams
Already
Removed***

**DAM
REMOVAL
EUROPE**

*based on data from France, Sweden, Finland, Spain, England and Wales, Scotland, Denmark, Portugal, Italy, Switzerland, Estonia, Germany

[View map](#)

The infographic features a large yellow number '6,762' on a dark grey background. To the right, the text 'Dams Already Removed*' is displayed in white, with a yellow scissors icon cutting through a vertical dashed line. Below this, a list of countries is provided in smaller white text. The background of the right side is a photograph of a dam structure. A yellow button labeled 'View map' is located at the bottom right of the infographic.



**OPEN
RIVERS
PROGRAMME**

€42.5M

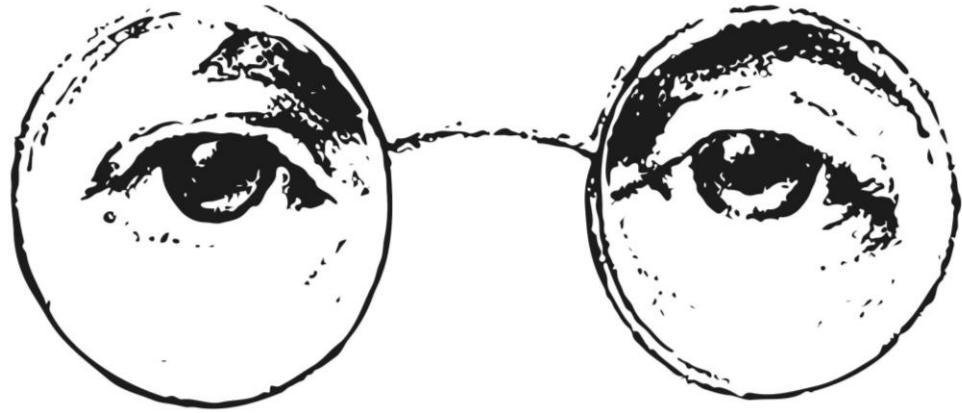
7

The potential gain is enormous

Acting on just **2%** of obsolete barriers might:

1. Mitigate the impacts of 3,000 obstacles

2. Free **30,000 km** of rivers (1 barrier = 10km gain)



IMAGINE

when the barriers are gone

1. [Some] rivers without walls, tubes or fences
2. ...with more plants, fish and water
3. Better rivers than we had ever known before...

**Many thanks
Any Questions?**

