



Barriers to Fish Passage, Habitat Degradation and Mitigation, with some Liffey examples

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Iascach Intíre Éireann
Inland Fisheries Ireland



An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

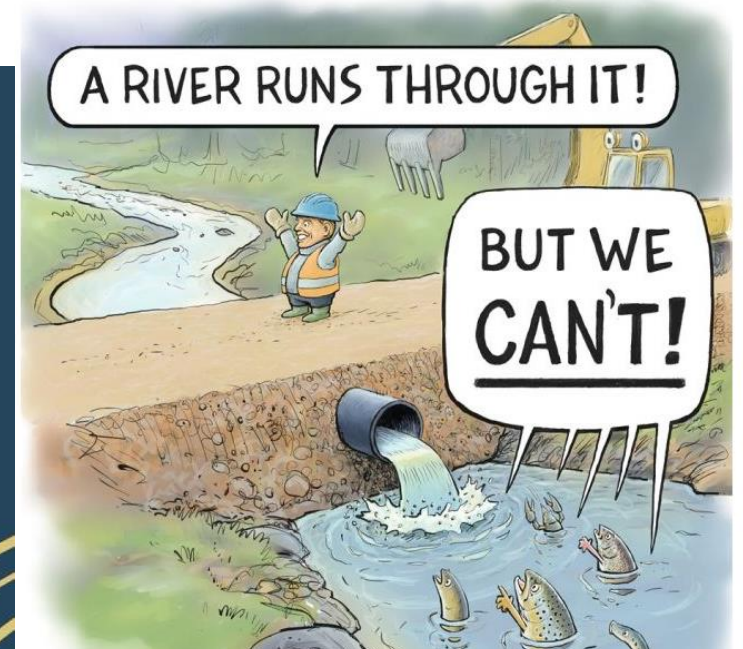
PRINCIPLES OF RIVERSCAPE HEALTH

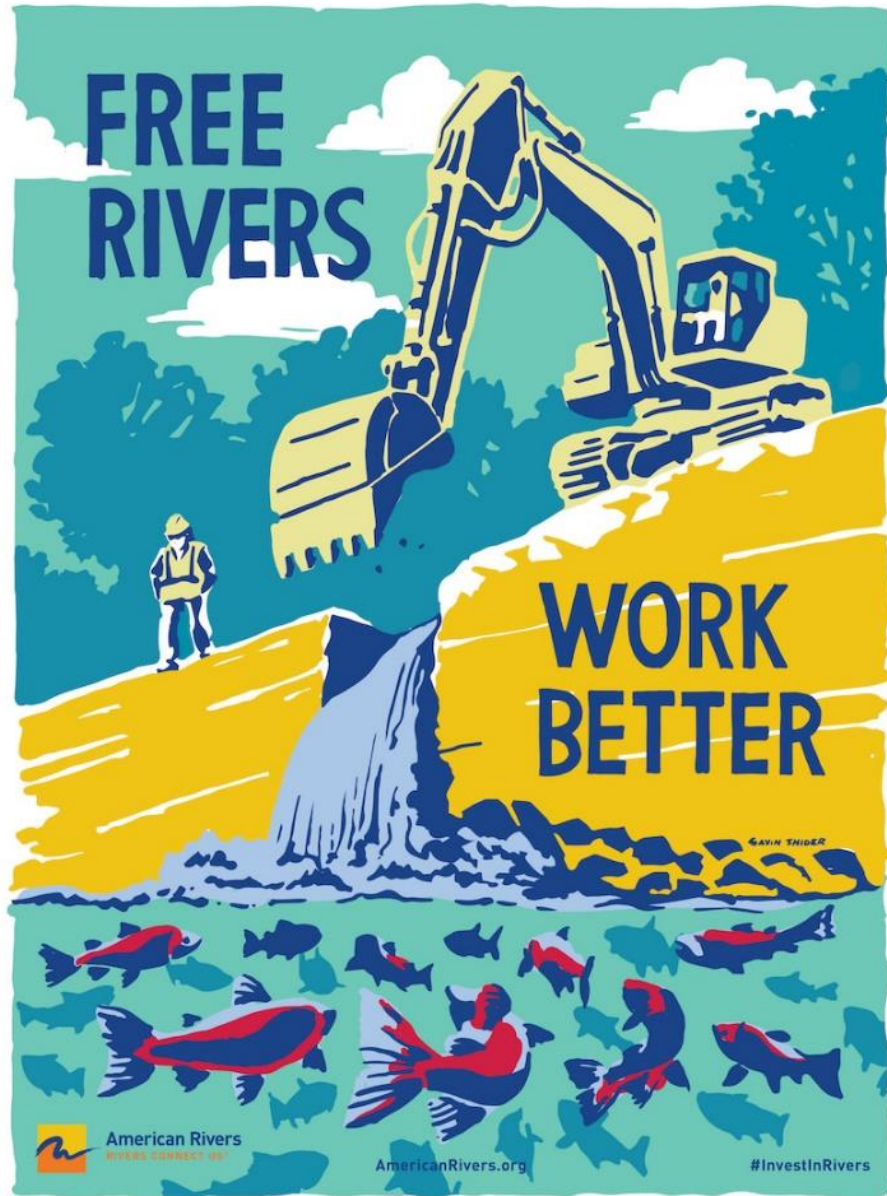


- 1 Streams need space & water
- 2 Structure forces complexity and builds resilience
- 3 Inefficient conveyance is healthy



"Why does it matter? Fish aren't the only species that depend on freshwater. The pollution, dams and shortages that push them to the brink put people and businesses at risk, too."
Stuart Orr, Freshwater Practice Leader



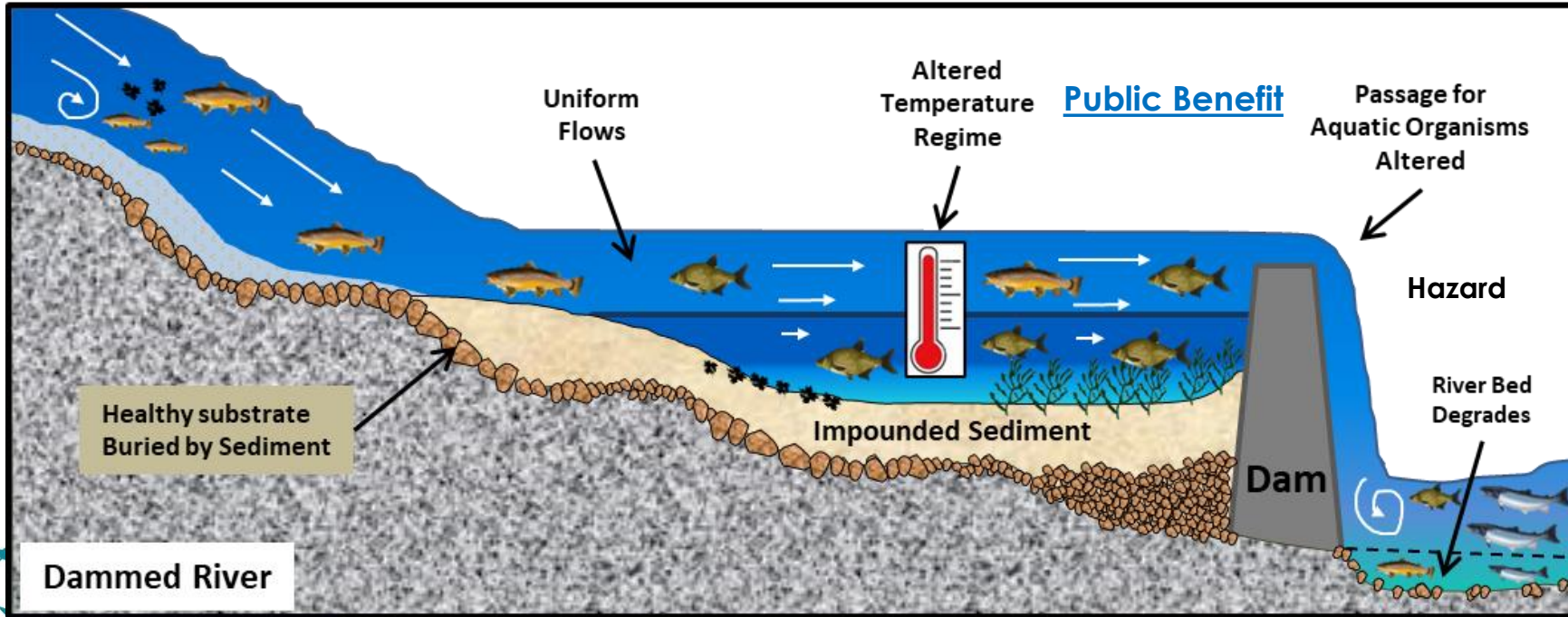
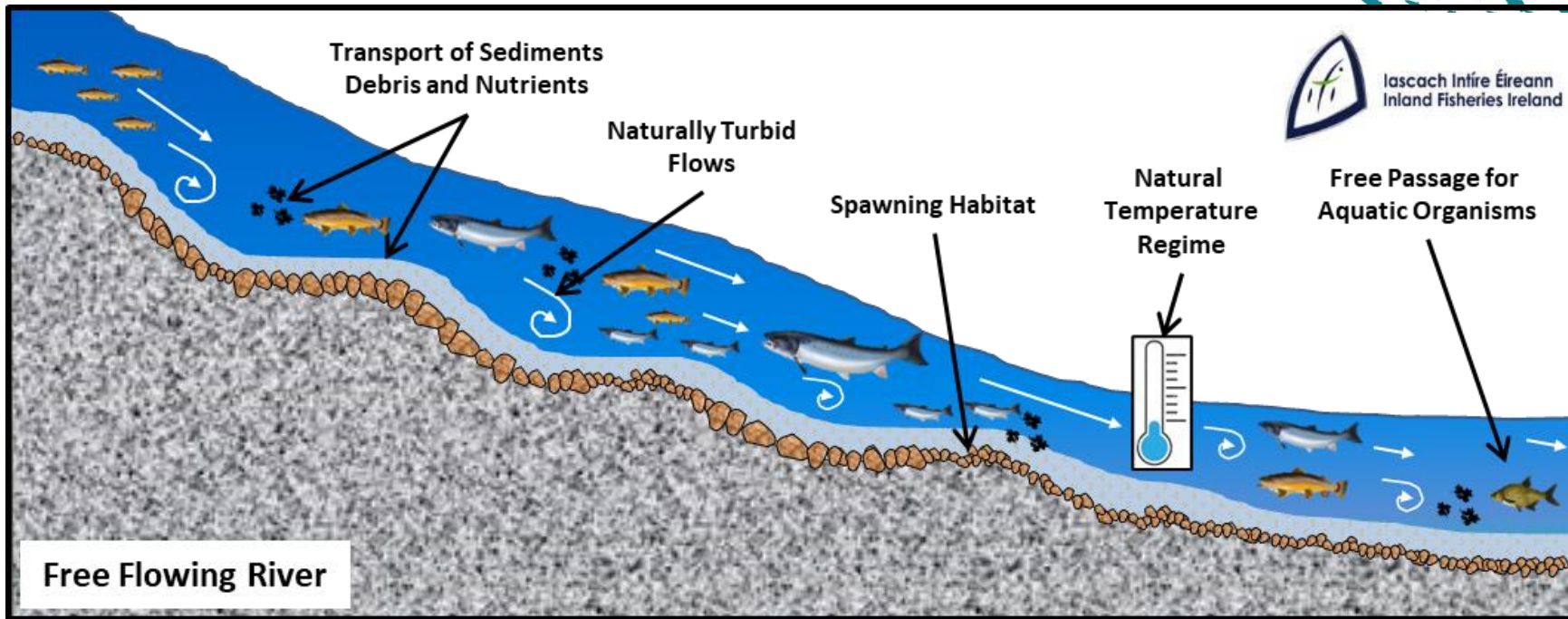


- Barrier Effects
- Who – Fish species
- Why – Drivers for change
- Barrier Types
- The R Liffey and DTAA Waters
- Barrier Assessment in Ireland
- Mitigation Strategies





Inland Fisheries Ireland



Fish Passage and Migration



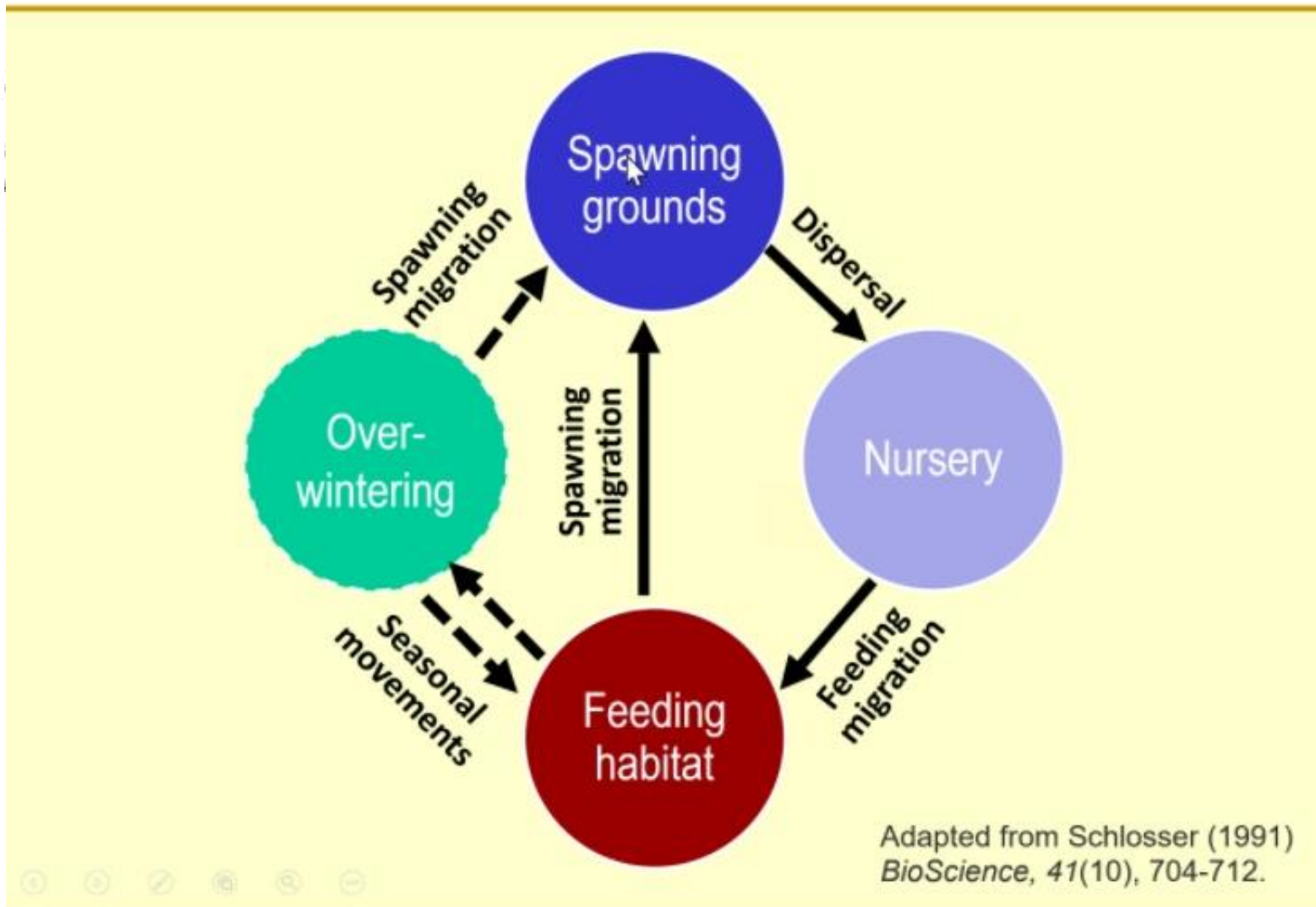
Sea – Freshwater:

- Atlantic salmon
- Sea trout
- Sea/ River lamprey
- European eel
- Twite/ Allis shad






Freshwater movement:

- Pike
- Bream
- Brook lamprey
- Brown trout

But it is not just 'migratory' fish that need to move



Implications of barriers for fish

- Delay/non-arrival at spawning grounds
- Multiple barriers in sequence – Compound effect 
- Physical damage – internal and external 
- Exposure to predators/poachers 
- Exposure to low flow/high temperature 
- Loss of energy/condition 
- Loss of eggs-milt



Upstream and Downstream
Migrants



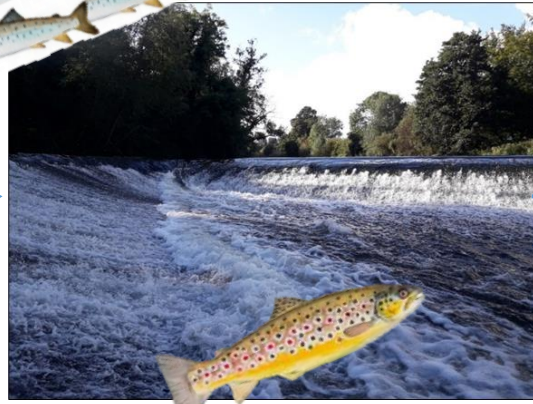


Exposure to predators



Compound Effect of Structures

SPAWNING
ADULTS



DRIVERS for change – European Directives



- **Water Framework Directive** - “The continuity of the river is not disturbed allows undisturbed migration of aquatic organisms and sediment transport”



Habitats Directive (Species protection in SAC) “obligation to maintain or restore the natural habitats and the populations of species of wild fauna and flora at a favourable status”

- Salmon (smolts, adults)
- Shad (Twaite & Allis)
- Lamprey (River, Sea, Brook)



- **EU Eel Regulations** - Eel (glass eel, yellow eel, silver eel)



- **EU Biodiversity Strategy for 2030** - Bringing nature back into our lives, “at least 25,000 km of rivers will be restored into free-flowing rivers by 2030”



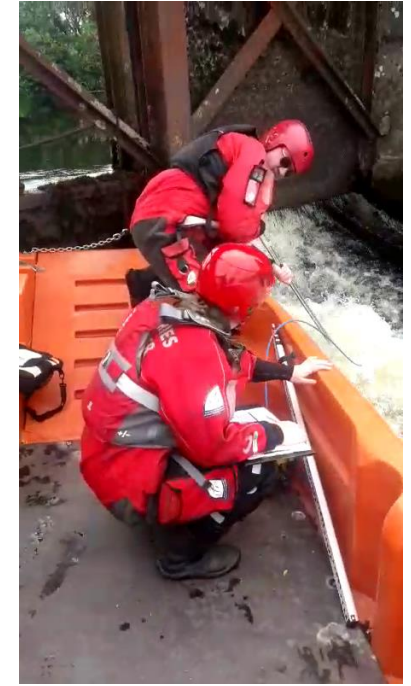
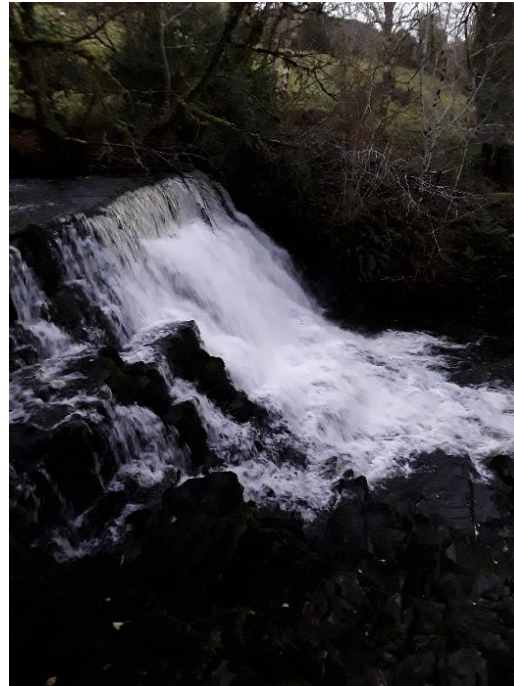
Natural



- Do **NOT** interfere with these – implications for
 1. WFD physical river form
 2. Biodiversity – genetic integrity/
Bio-security

Artificial or Man-made

- Dam
- Culvert
- Weir
- Ford
- Sluice



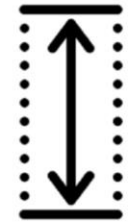
To understand the barrier effect you must ...

THINK LIKE A FISH

And
understand
their
limitations



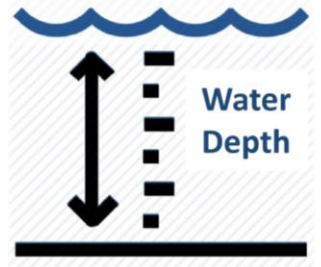
When does a structure become a barrier?



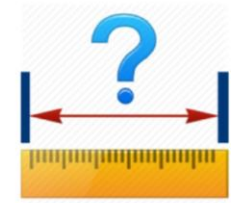
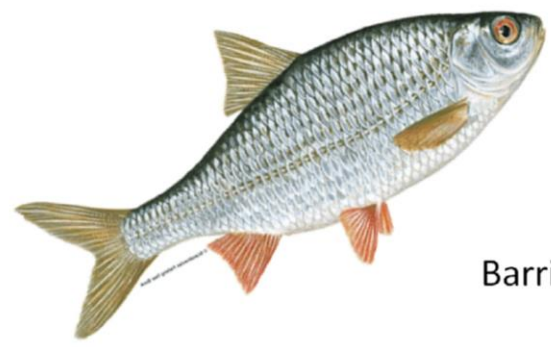
Hydraulic Head

Barrier at: **Greater than 0.1m**

Rule of:



Barrier at: **Less than 0.1m**



Effective Length

Barrier at: **Greater than 10m**



Riverine Fish Barrier Assessment Tool: Coarse Resolution – EG: SNIFFER: Survey



Dam



Barrier that blocks or constrains the flow of water and raises the water level, forming a reservoir.



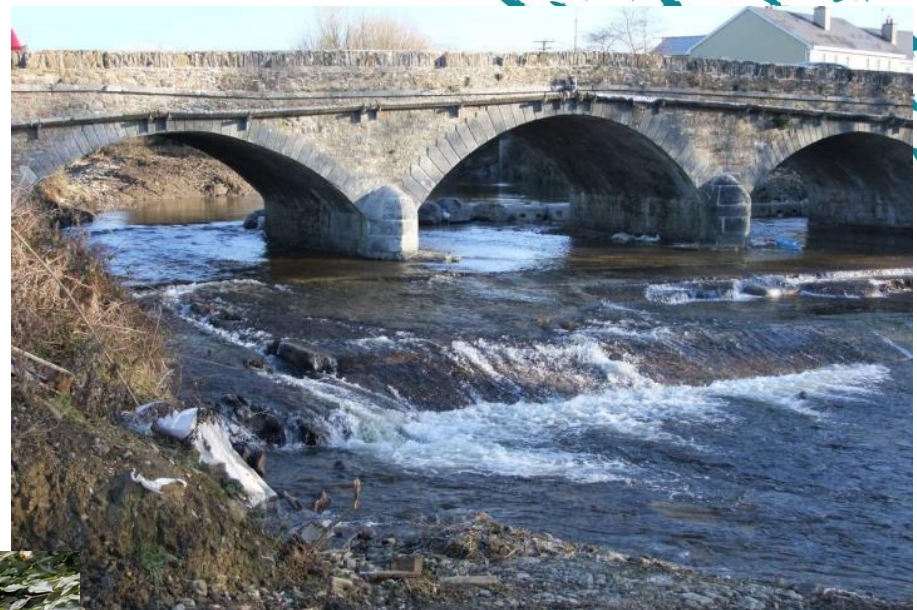
Dams are often used in the generation of electricity and the supply of water.



Culvert

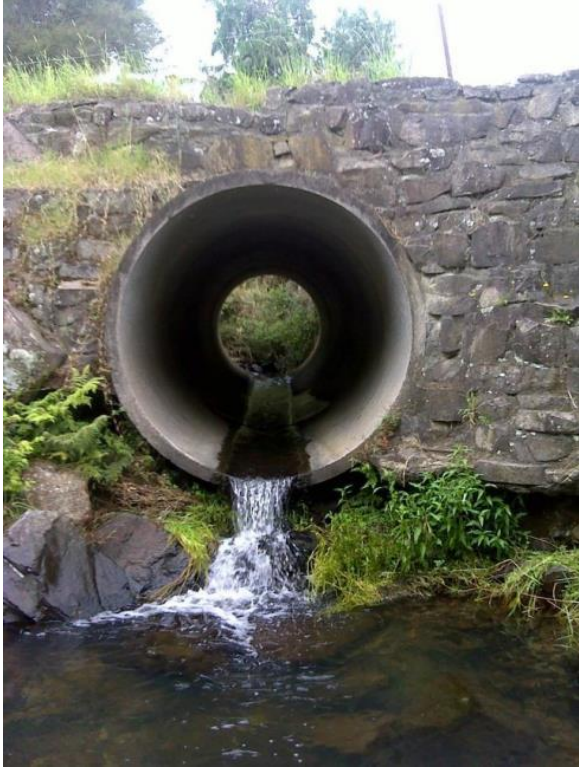


A structure which allows a stream or river to flow through/under an obstruction.



Streams change over time





Culvert



often embedded in soil and come in many shapes and sizes, varying from round and elliptical to box-shaped

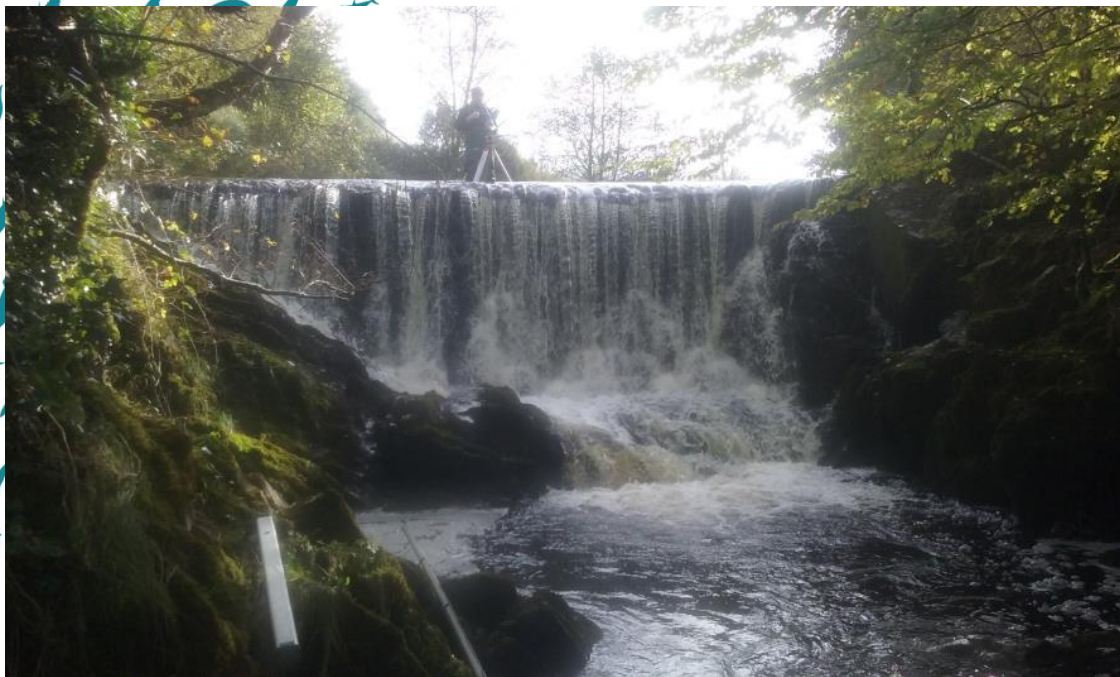


Weir



Structure aimed at regulating flow conditions and water levels or at intercepting sediment or at reducing the channel slope for stabilizing the channel bed of a river or stream.





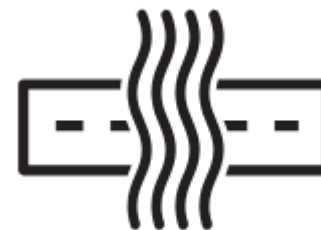
Weir



Water often flows freely over the top of a weir <5m in height



Fords



Structure which creates a shallow place for crossing by vehicle or on foot.



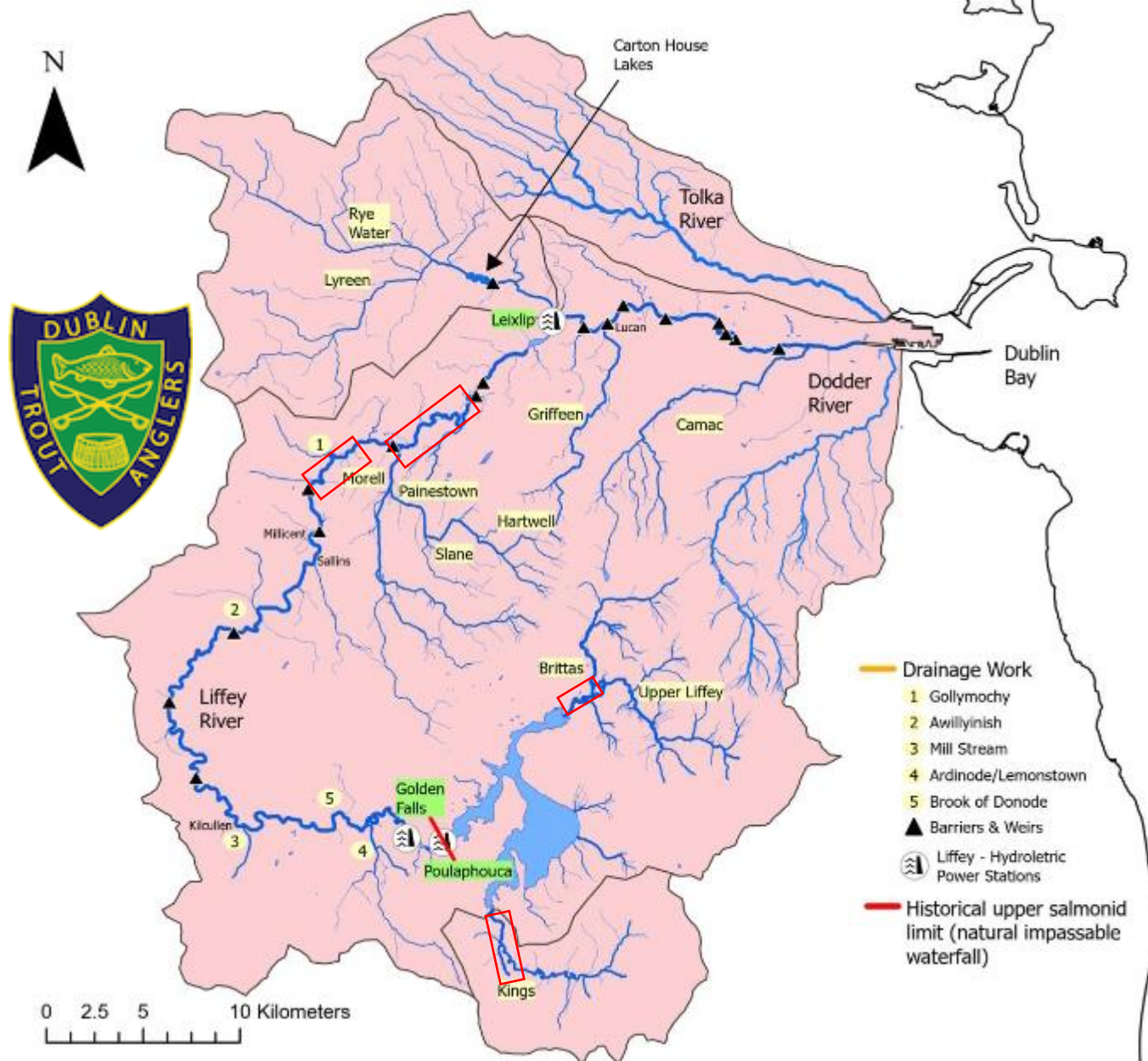


Sluice

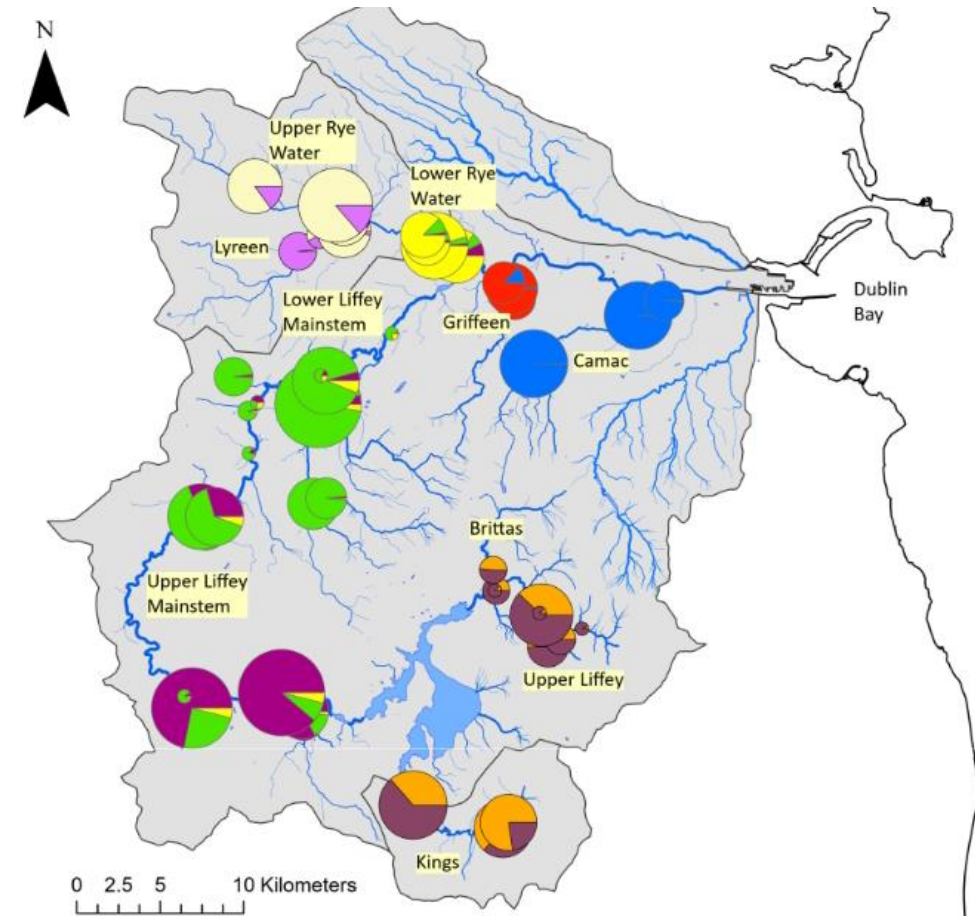


A movable barrier aimed at controlling water levels and flow rates in rivers and streams. By opening or closing the sluice, water levels and flow rates can be altered.

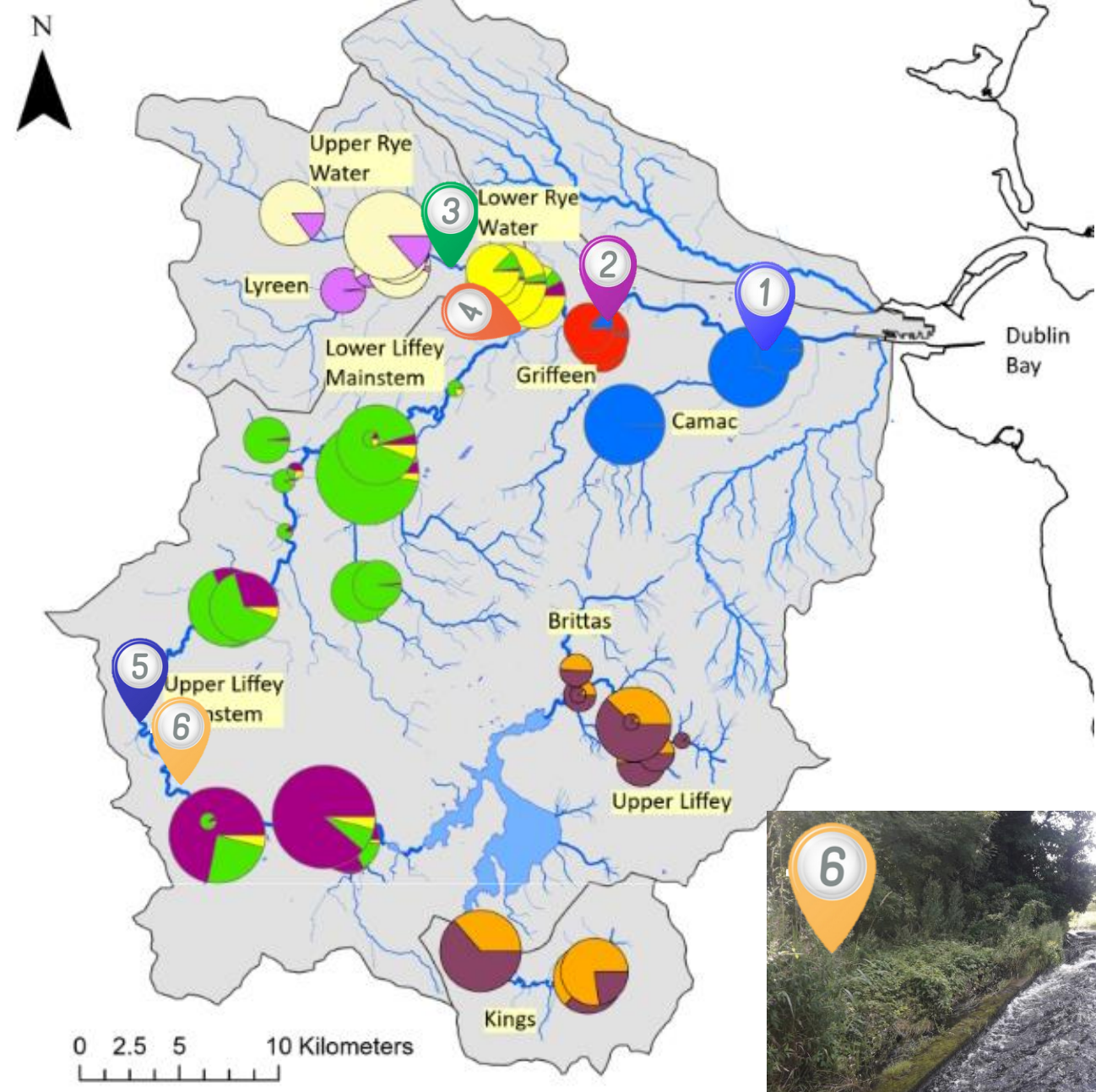




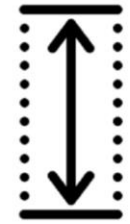
Population Structure and Genetic Stock Identification of the Liffey Catchment Brown Trout



Graphical illustration of the ten Liffey River catchment brown trout populations.



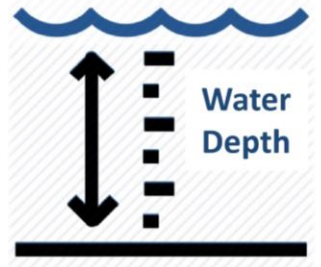
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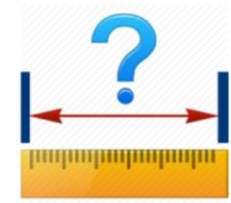
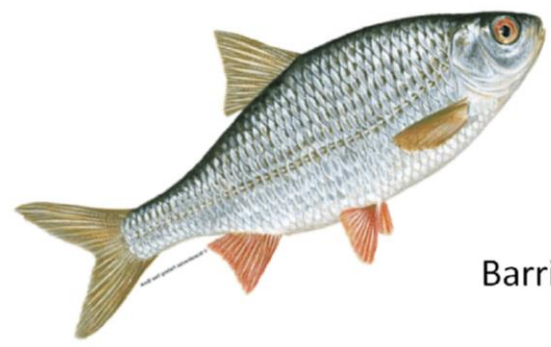
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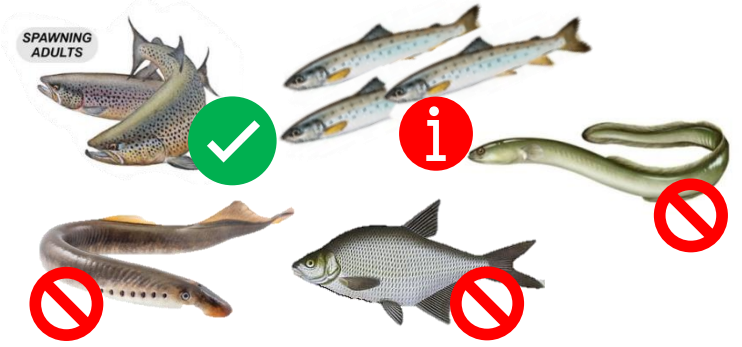
Riverine Fish Barrier Assessment Tool: Coarse Resolution – EG: SNIFFER: Survey





Any problems here for fish?

THINK LIKE A FISH ?



Many fish passage solutions based on designs created for temperate northern hemisphere salmonids (Birnie-Gauvin et al. 2019).

Any problems here for fish?



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Problems



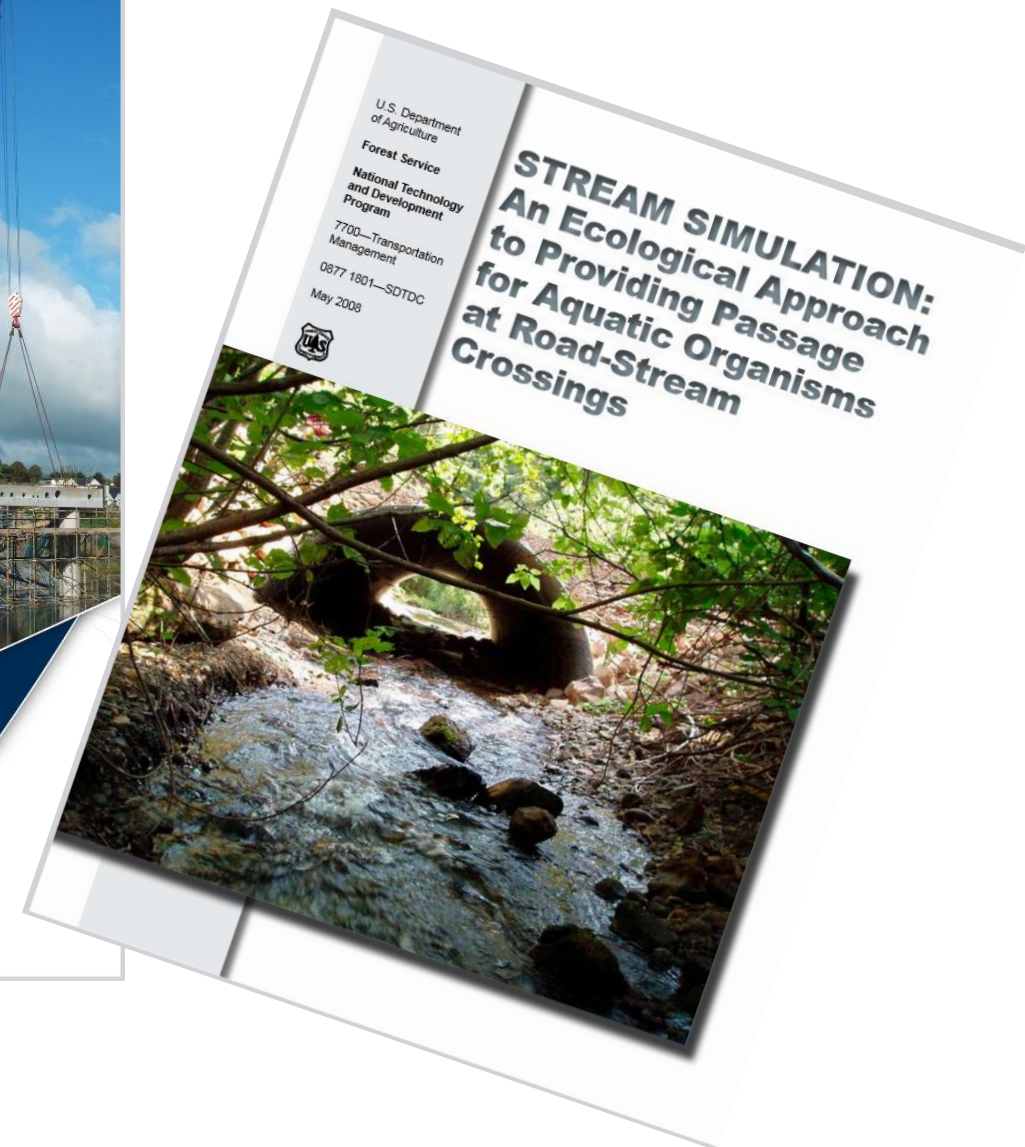
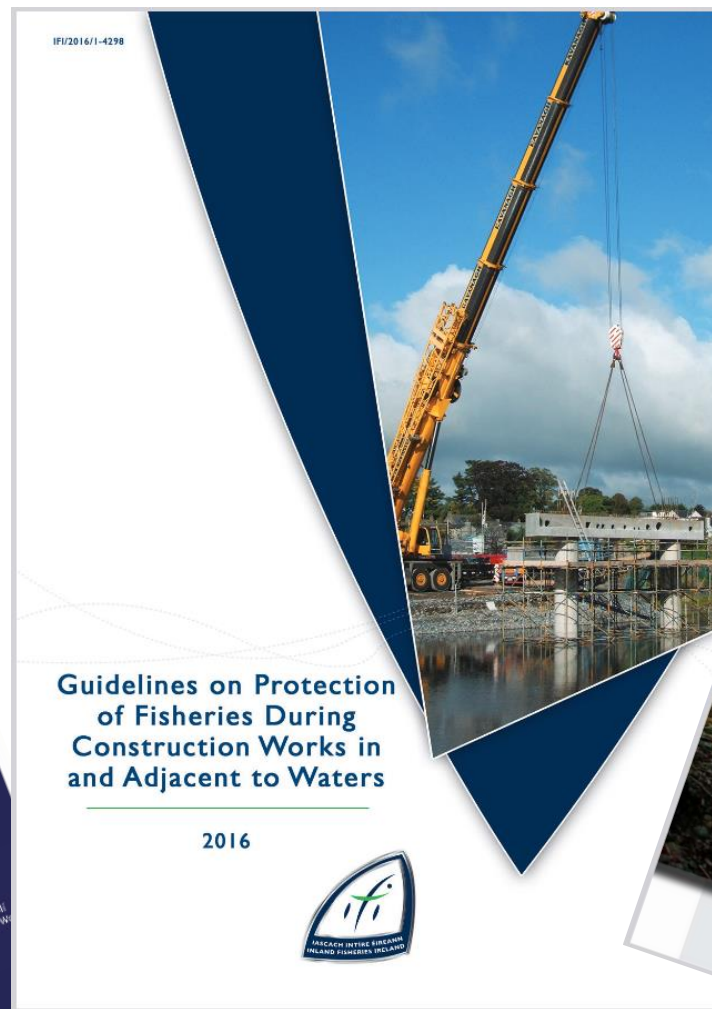
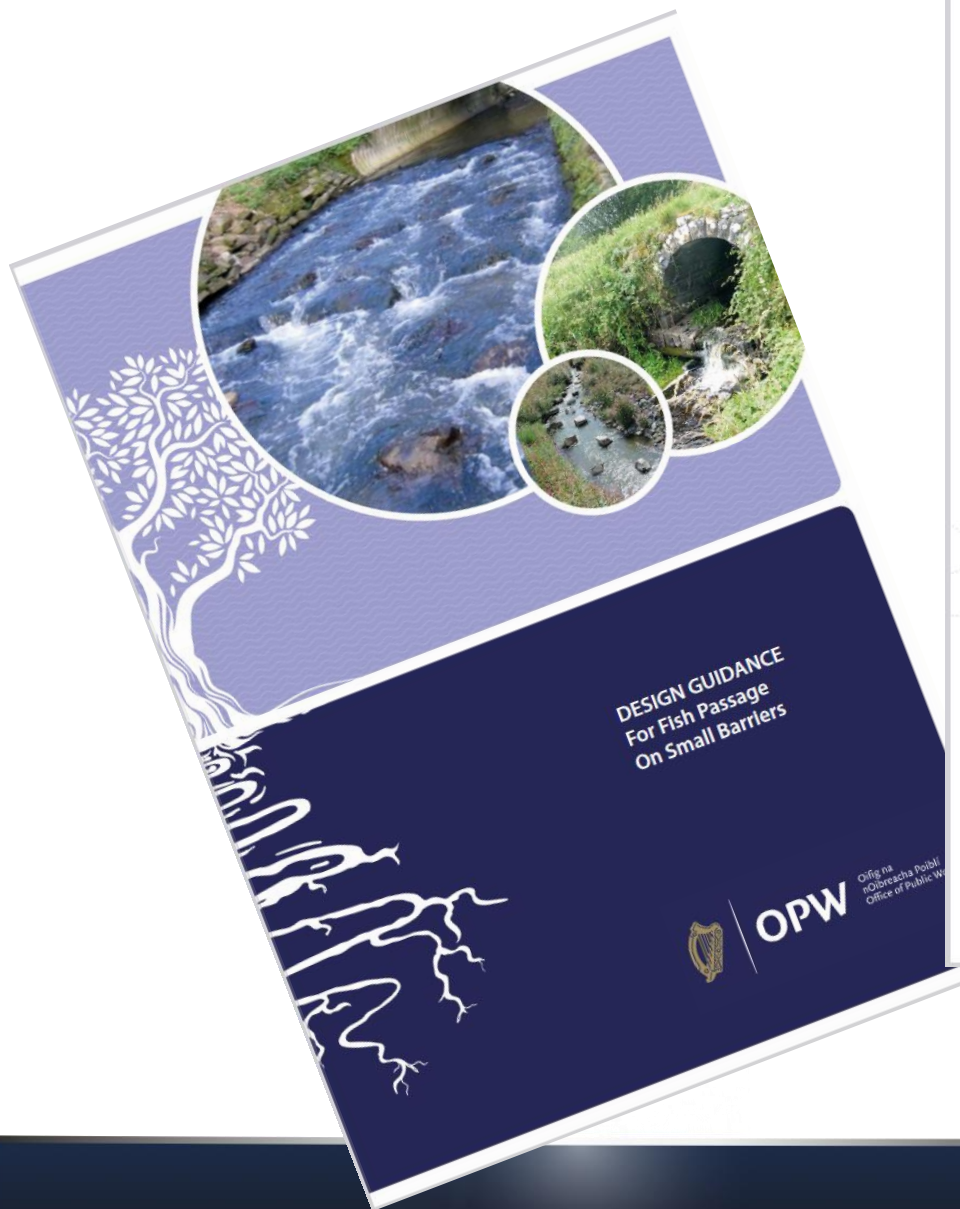
Before and after



Photo: Fredrik Broman, www.humanspectra.com



Practical Solutions





National Barriers Programme 2022 - 2027



Scope:

Deliver an inventory of barriers structures on Irish rivers supported by applied studies that will inform best practice approaches to barrier mitigation.

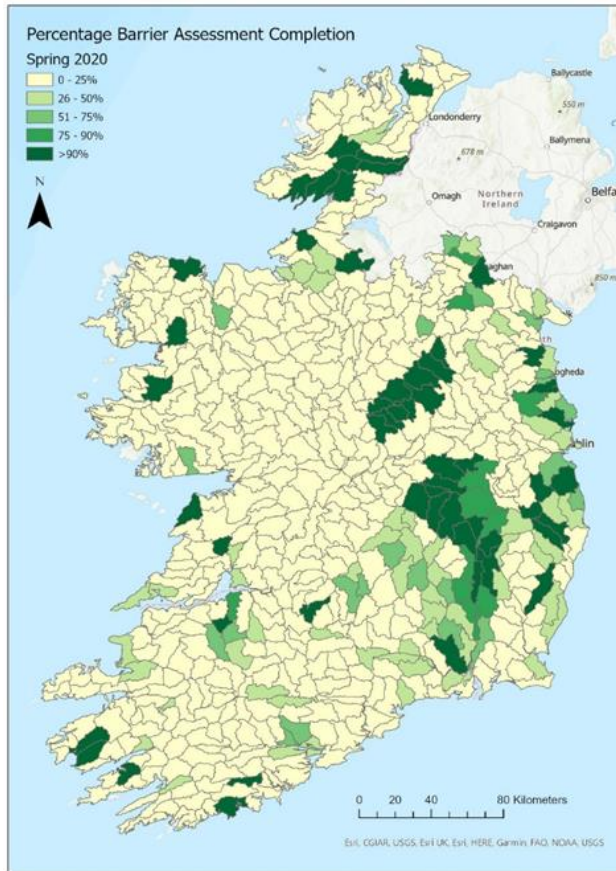
Highlights:

- Further integration and evolution of barrier assessment tools
- A comprehensive programme of barrier surveys
- Develop a national, regional and catchment-based prioritisation matrix and *provide documentation for funding proposals for mitigation works*
- Research into the impact of barriers and the effectiveness of management approaches.
- *Co-ordinate with Government agencies* on incorporating barrier assessments into their maintenance cycle

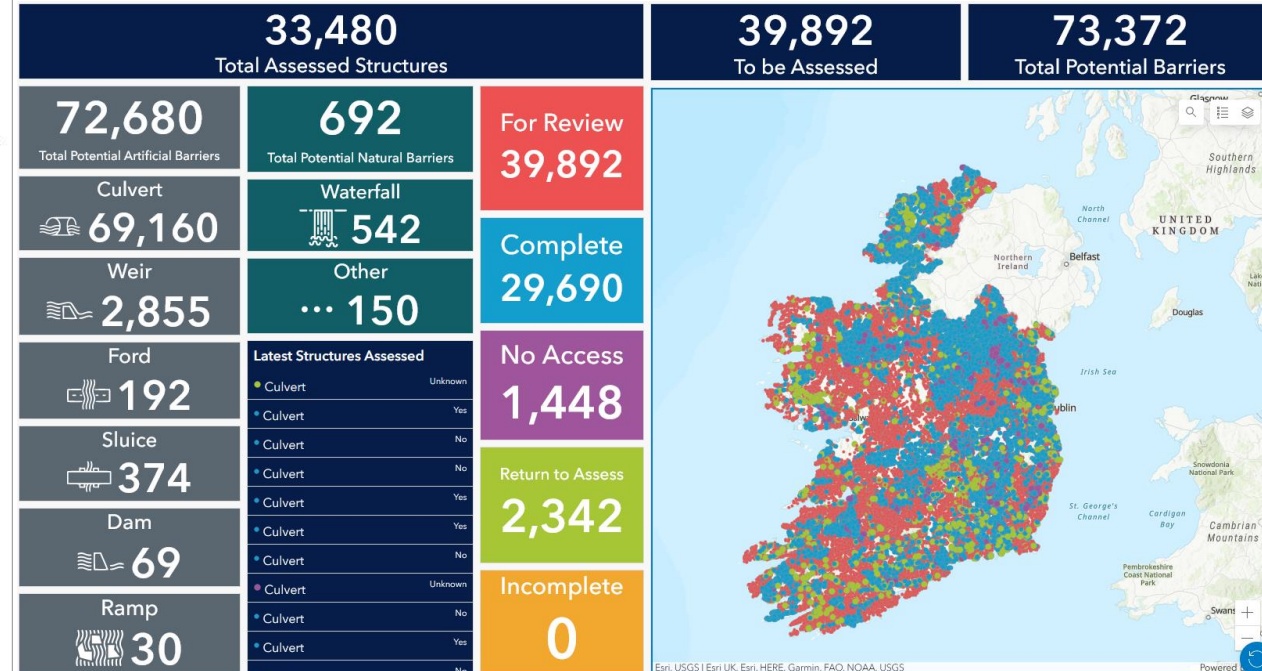
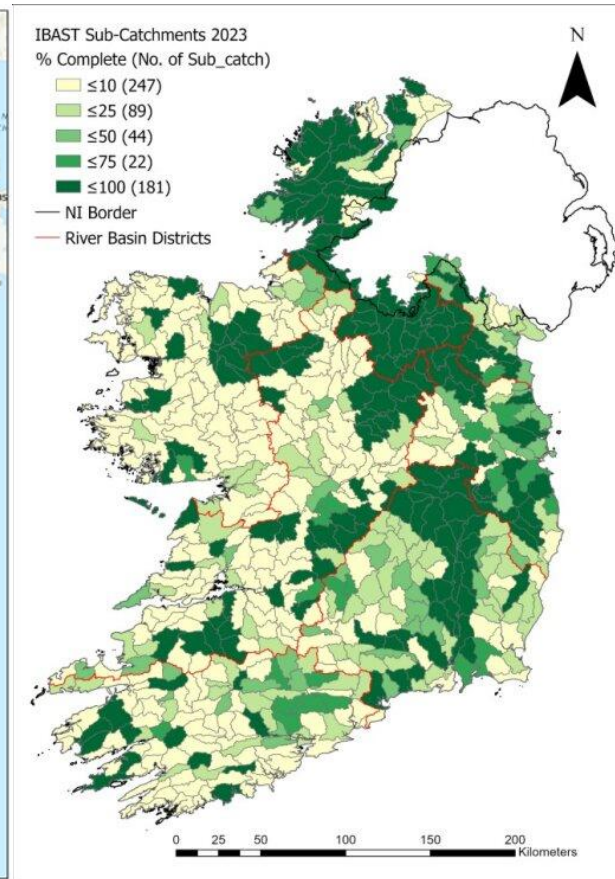


NBP - Progress to date

Spring 2020



Winter 2022



[Inland Fisheries Ireland - Open Data Portal](#)
- National Barriers Programme Dataset

Barrier Assessment to Date in the Liffey Catchment

1,774
Total Potential Artificial Barriers

36
Total Potential Natural Barriers

Culvert
1,425

Waterfall
31

Weir
327

Other
5

Ford
4

Latest Structures Assessed

Sluice
13

No
Culvert
01/01/2019

Dam
5

No
Culvert
01/01/2019

Ramp
0

Unknown
Culvert
01/01/2019

No
Culvert
01/01/2019

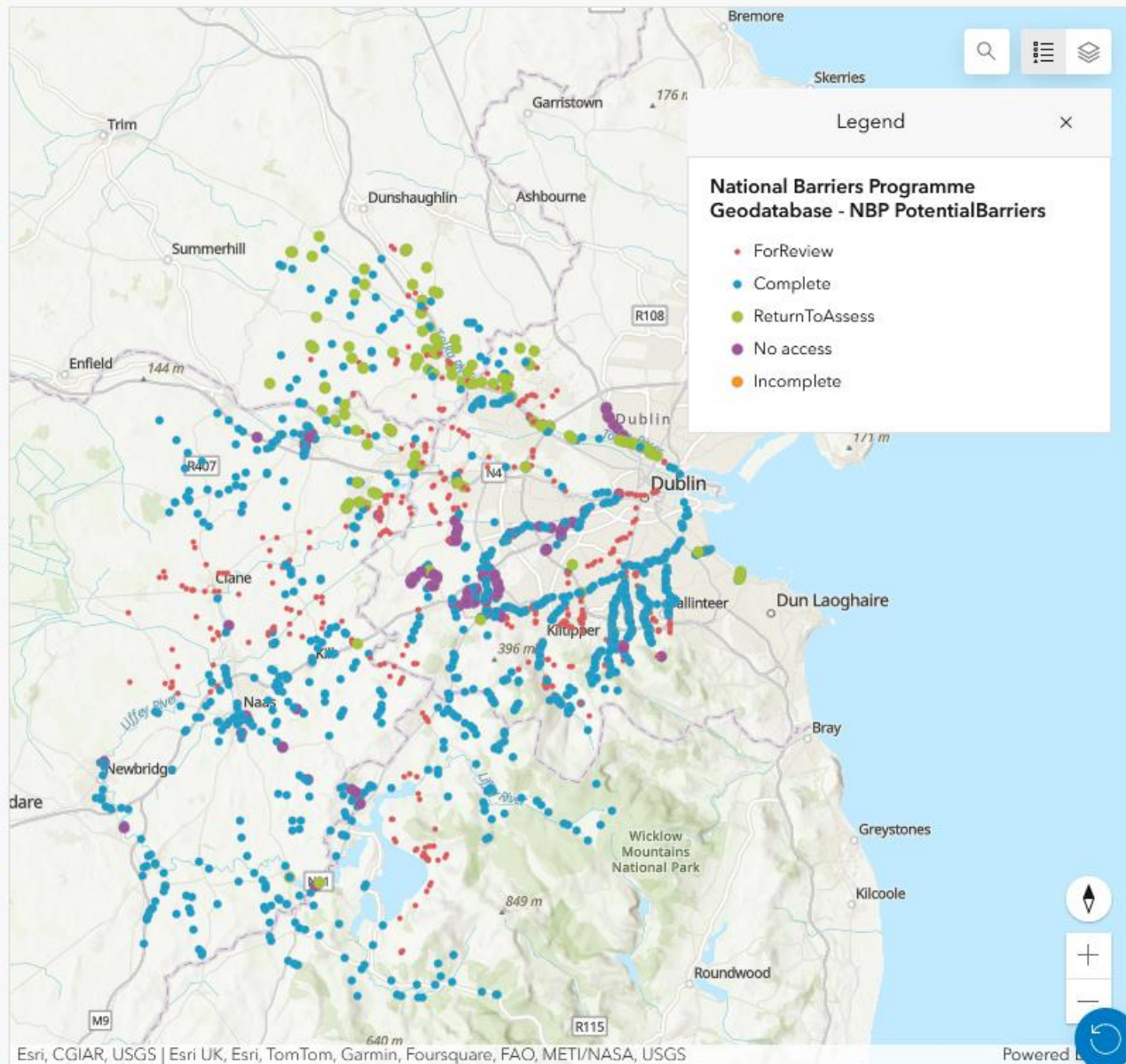
For Review
453

Complete
1,109

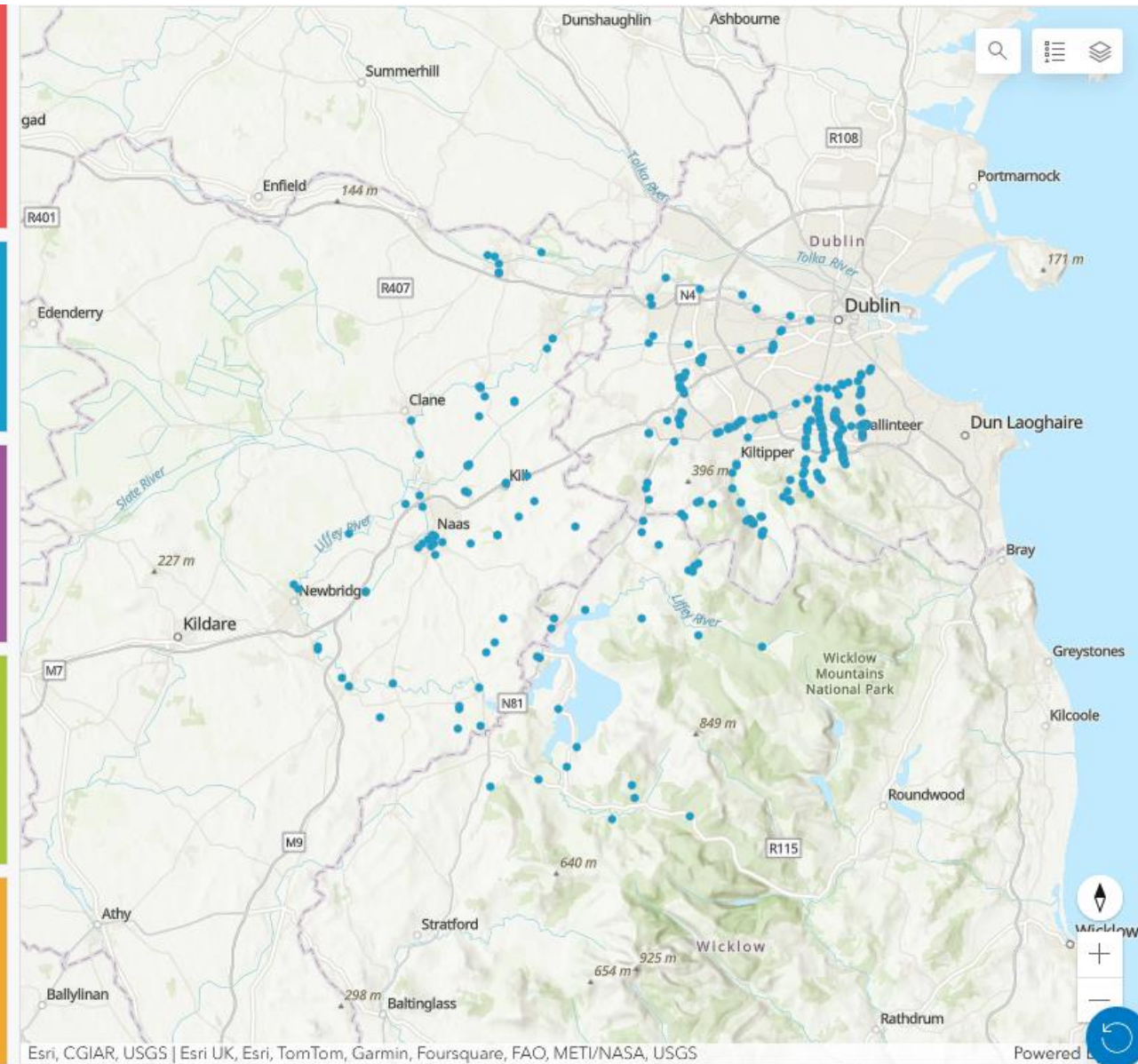
No Access
115

Return to Assess
133

Incomplete
0



Identified Barriers to fish passage in the Liffey Catchment



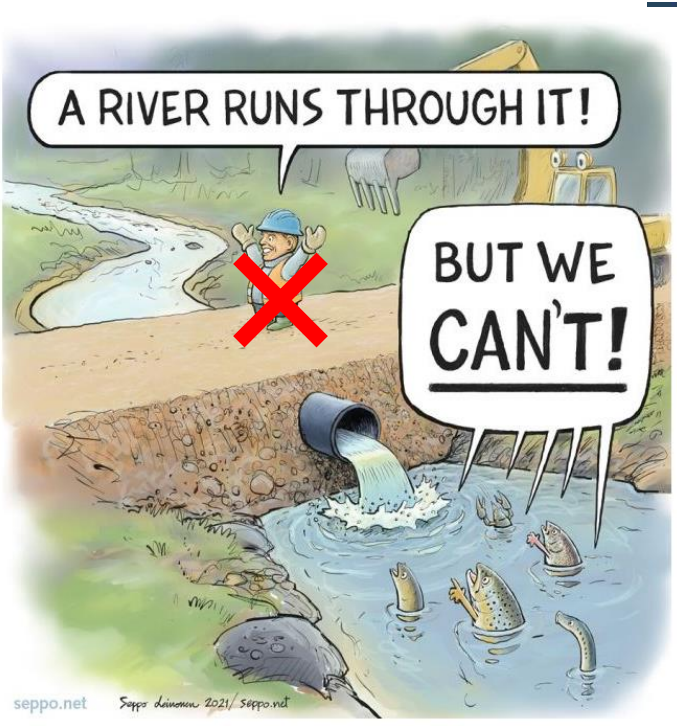
New National Barriers Mitigation Programme

- IFI – Establishing a Barrier Mitigation Division – 2023/2024
- Overseen by the New National Hydromorphology Expert Group
- ~270 barriers to fish passage removed or modified during 1st cycle of programme
- Part of Catchment Action Plans led by LAWPRO
- Pre and post monitoring will be undertaken
- DHLGH will shortly submit a memo to government - minimum investment of €50 million is estimated

Flagship Pilot Projects

Ardnacrusha Parteen Hydro scheme, Lower Dodder fish passage, Annacotty Weir – fish passage (Mulkear, R.), Clohamon Weir and Tail Race, Slaney R





Animals don't go extinct because someone shoots the last one, or a bulldozer scrapes away the last habitat. They go extinct because the web of relationships that sustains them unravels...they go extinct because of a lack of ecological companionship."

Jim Lichatowitch (2013)



Questions?



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