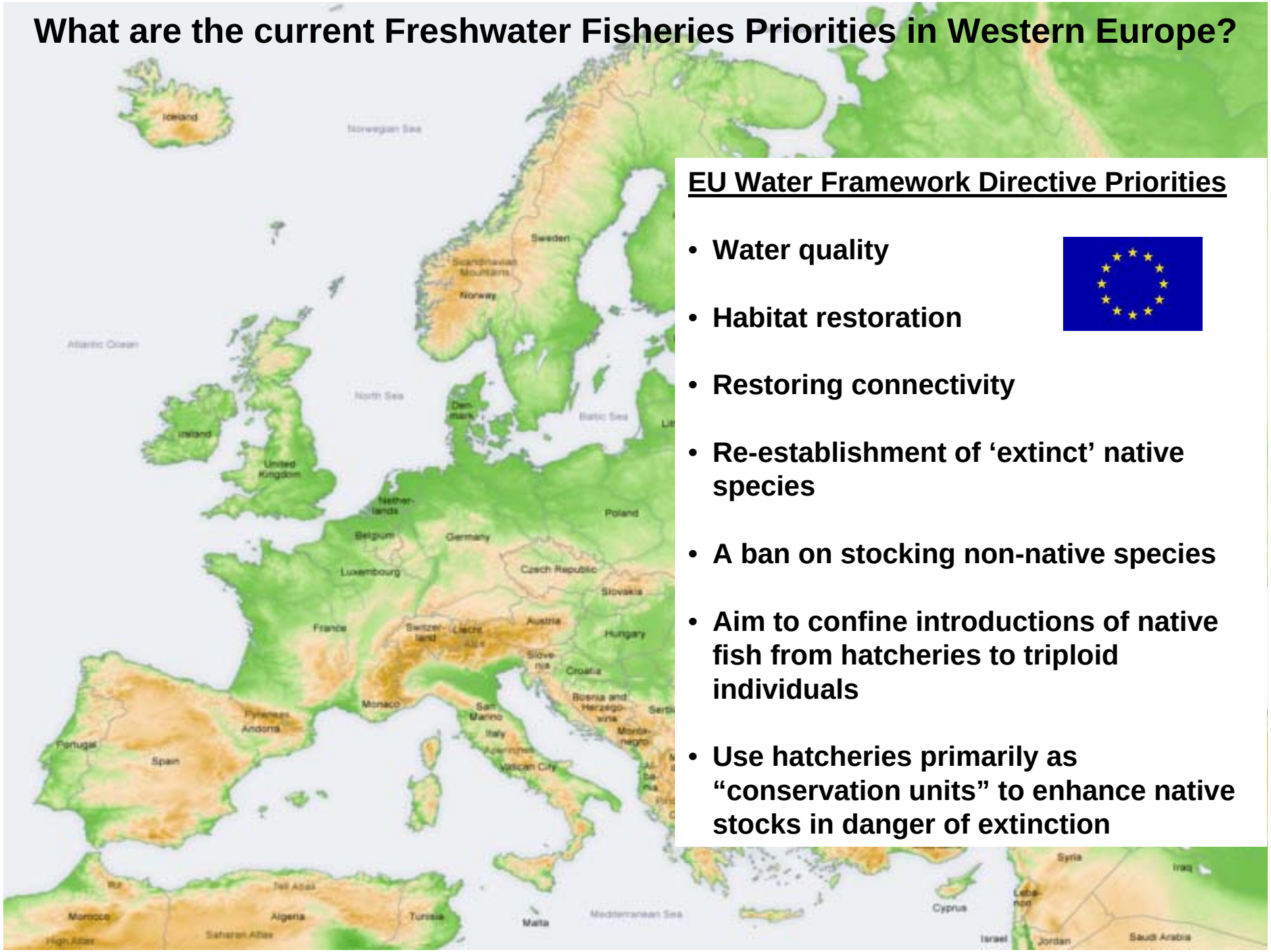
Freshwater Fisheries Management in Ireland

Dr Martin O'Grady
Senior Research Officer
Inland Fisheries Ireland

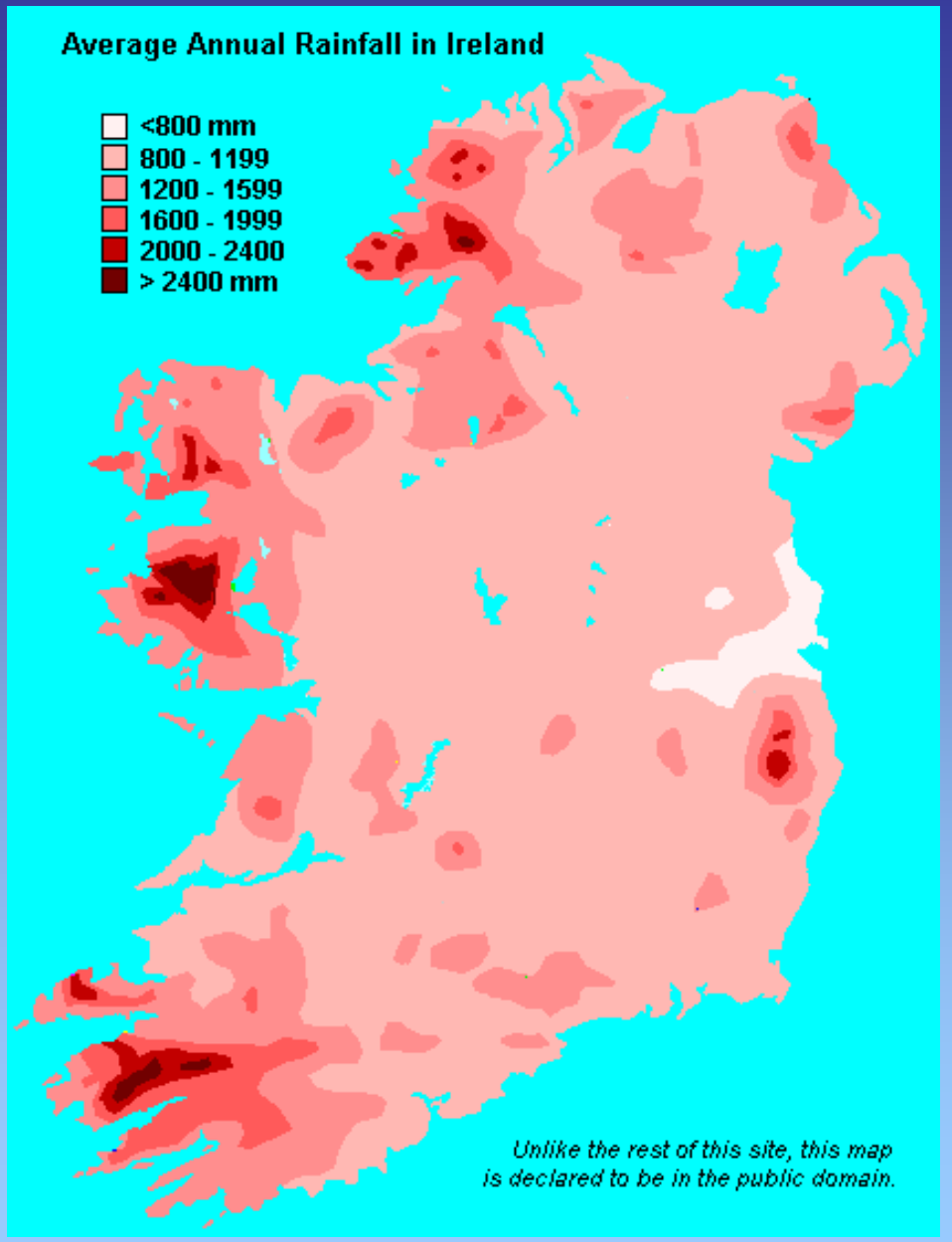
What are the current Freshwater Fisheries Priorities in Western Europe?

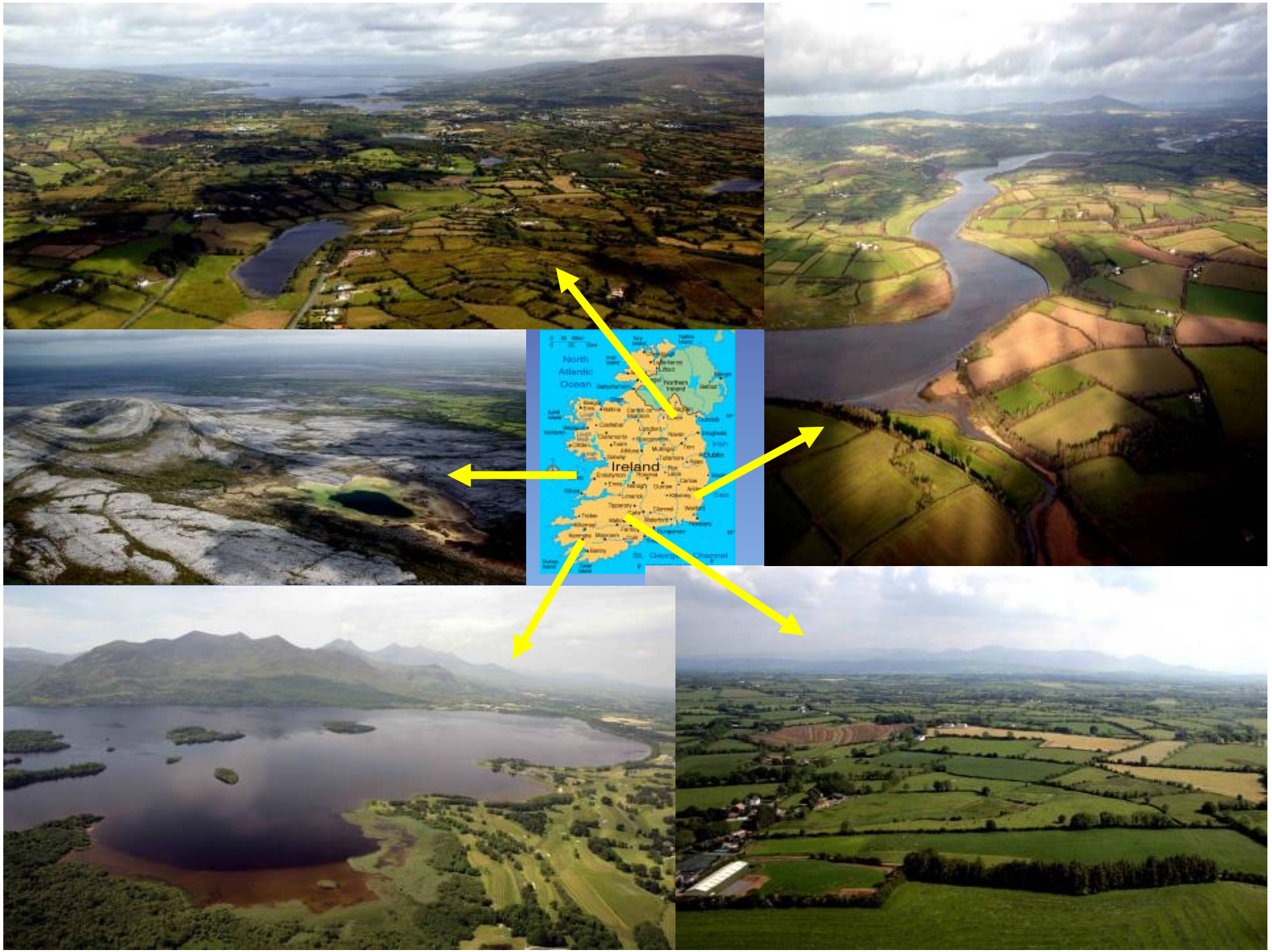


EU Water Framework Directive Priorities

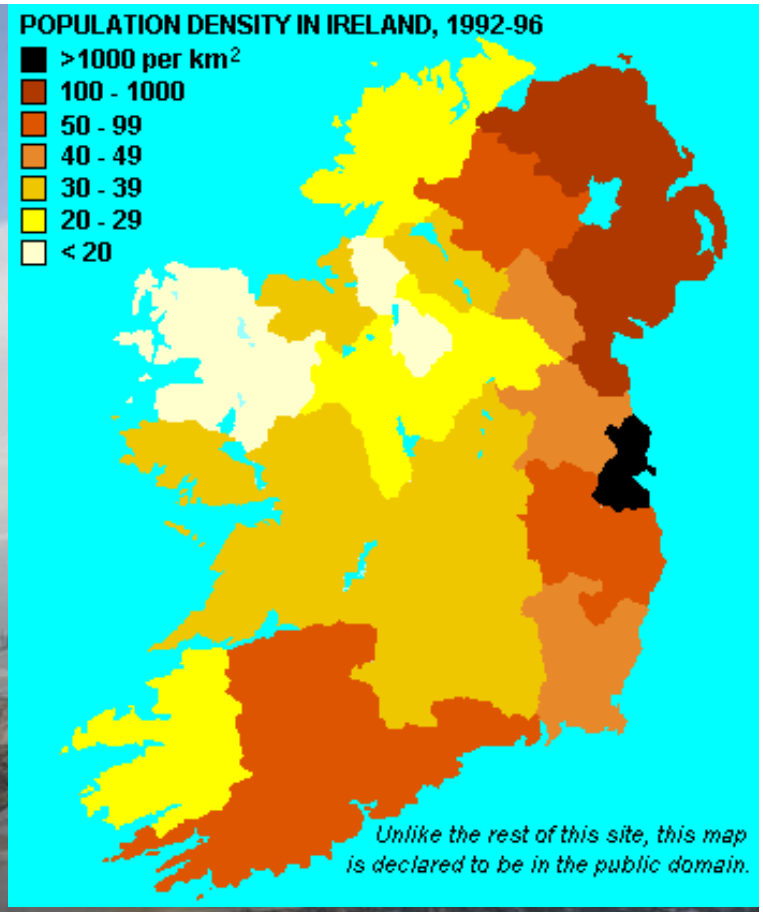
- **Water quality**
- **Habitat restoration**
- **Restoring connectivity**
- **Re-establishment of ‘extinct’ native species**
- **A ban on stocking non-native species**
- **Aim to confine introductions of native fish from hatcheries to triploid individuals**
- **Use hatcheries primarily as “conservation units” to enhance native stocks in danger of extinction**

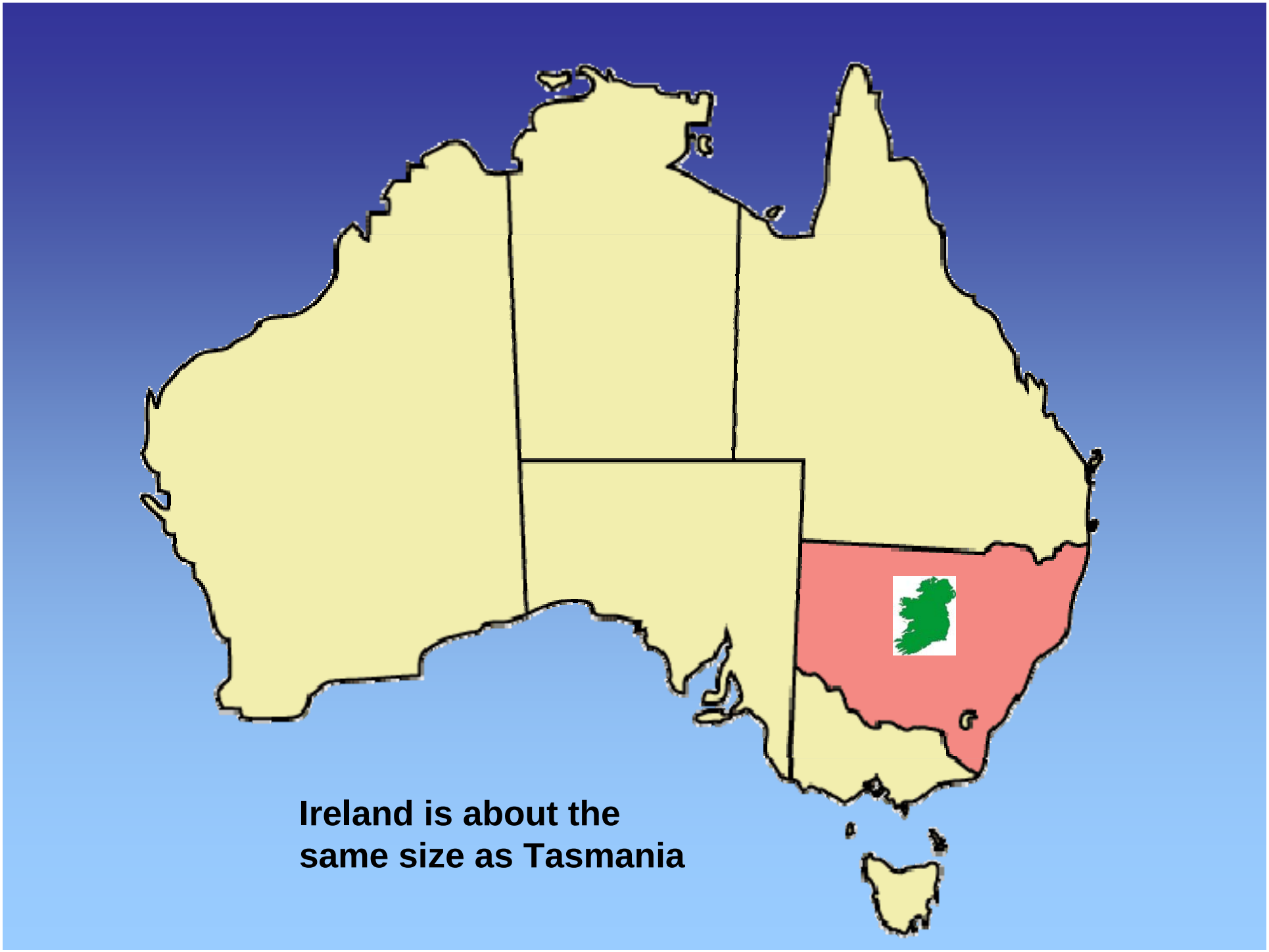
Ireland is a wet and windy place !




North
Atlantic
Ocean
Ireland

Most people in Ireland live along the east coast

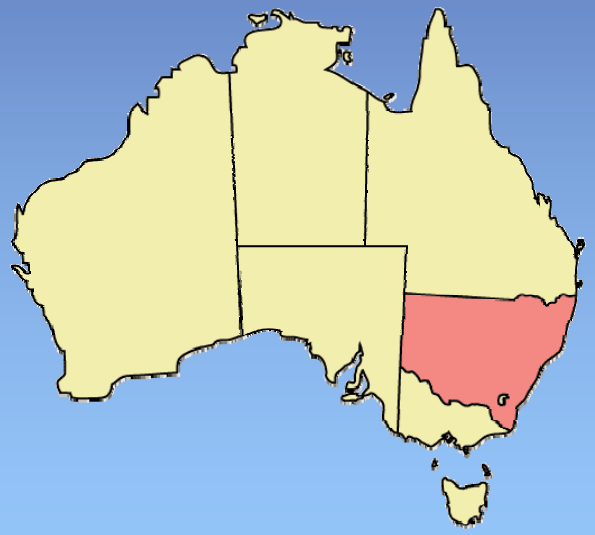



Ireland is about the
same size as Tasmania

Why are there so few native species in Ireland?

New South Wales

Native freshwater fish species ~ 46



Ireland

Native fish species = 9

Brown Trout

Pollan

Salmon

Char

Eels

The previous Irish fishes are only 18,000 yrs old.

The Murray cod and other native NSW freshwater fishes are at least 26 million (perhaps up to 60 million) yrs old.

Image: Gunther Schmida

Introduced species in Ireland:

Perch

Roach

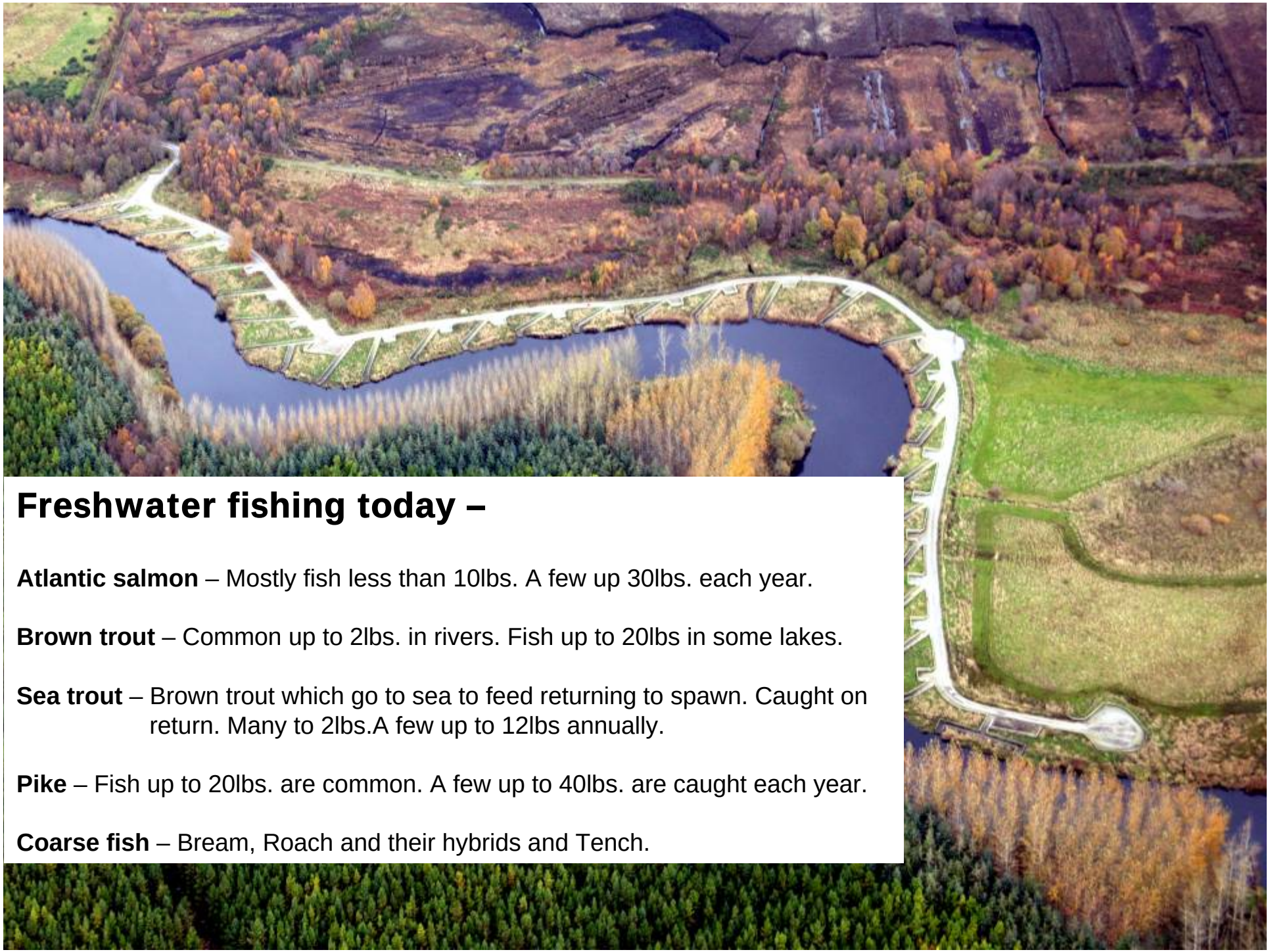
Tench

Rudd

Bream

Pike

Current total of 24 freshwater species



Freshwater fishing today –

Atlantic salmon – Mostly fish less than 10lbs. A few up 30lbs. each year.

Brown trout – Common up to 2lbs. in rivers. Fish up to 20lbs in some lakes.

Sea trout – Brown trout which go to sea to feed returning to spawn. Caught on return. Many to 2lbs.A few up to 12lbs annually.

Pike – Fish up to 20lbs. are common. A few up to 40lbs. are caught each year.

Coarse fish – Bream, Roach and their hybrids and Tench.

Problems in Irish Rivers over the centuries

By the 12th Century most of Ireland's forests had been cleared leaving open plains

(1% Ireland afforestated)

Productive agricultural areas consist of a patchwork of small fields

Flour Milling – an 18th century phenomenon

A typical Irish flour mill weir

Weirs created 2 problems –

1. **fish passage for marine lampreys**
2. **capital loss of salmonid water in the ponded reach u/s**

Hydro dams wipe out migratory fish runs (few in Ireland)

Dams tend to be in the lower reaches of rivers, not at the top

The “Luck of the Irish”

We “missed” the 18th Century European Industrial Revolution

– good fortune, not good management

Pike

Introduced in the 16th Century, gradually spread throughout catchments

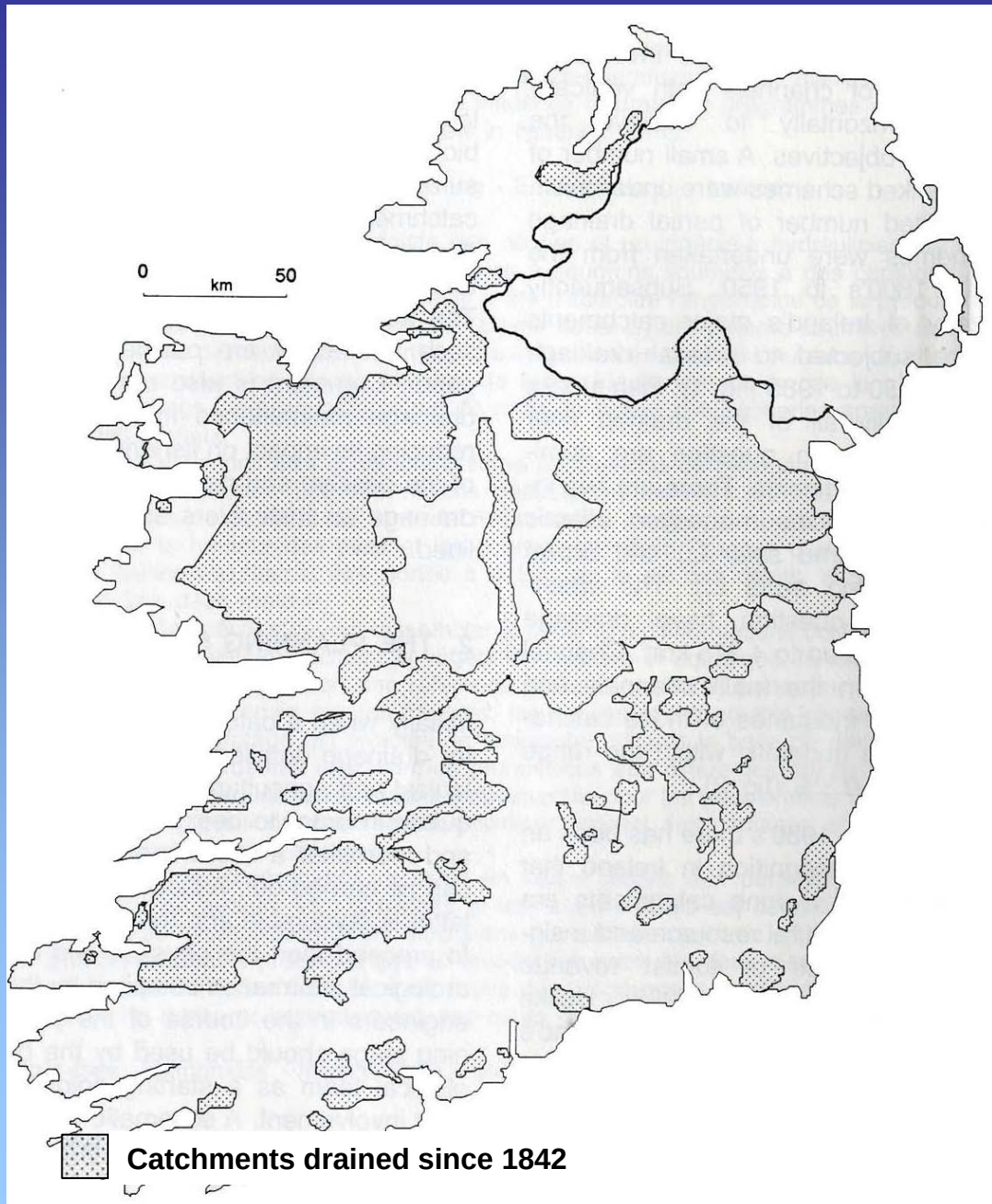
The introduction of pike has:

- **reduced trout stock densities at best,**
- **led to the complete extinction of trout populations at worst.**

Arterial drainage programmes 1842 and 1970

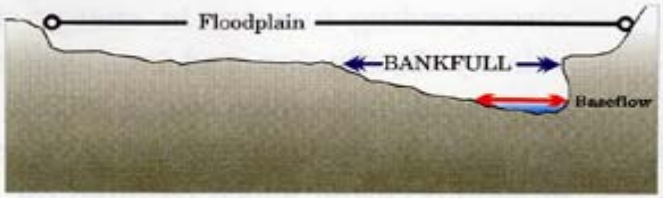
Arterial drainage objectives:

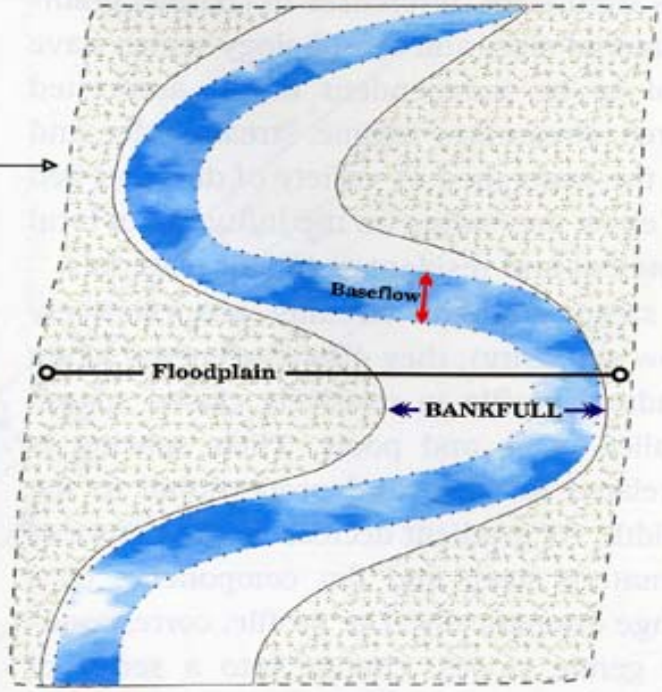
1. **to reduce incidents of flooding**
2. **to improve the quality of marginal agricultural land by increasing run off**.



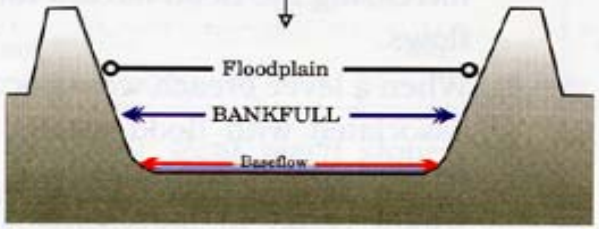
Channel Drainage example

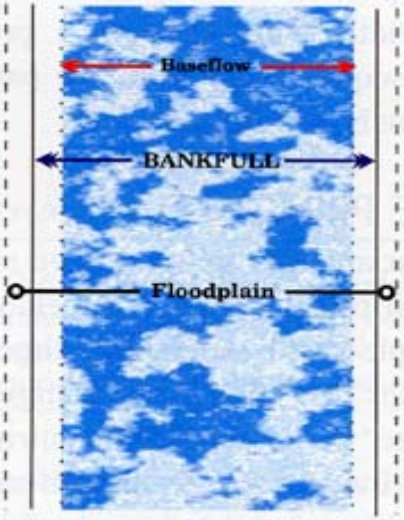
NATURAL Channel





Channelized "DESIGNED" Channel





Designed to contain a Q3 to Q5 flood event at most.

Severe overgrazing in selected areas

More recent problems:

- Intensive farming resulting in eutrophication in the 1970s

- Roach introduction in the 1970s

- Zebra mussels in the 1990s

Huge roach populations – the Irish equivalent to carp!

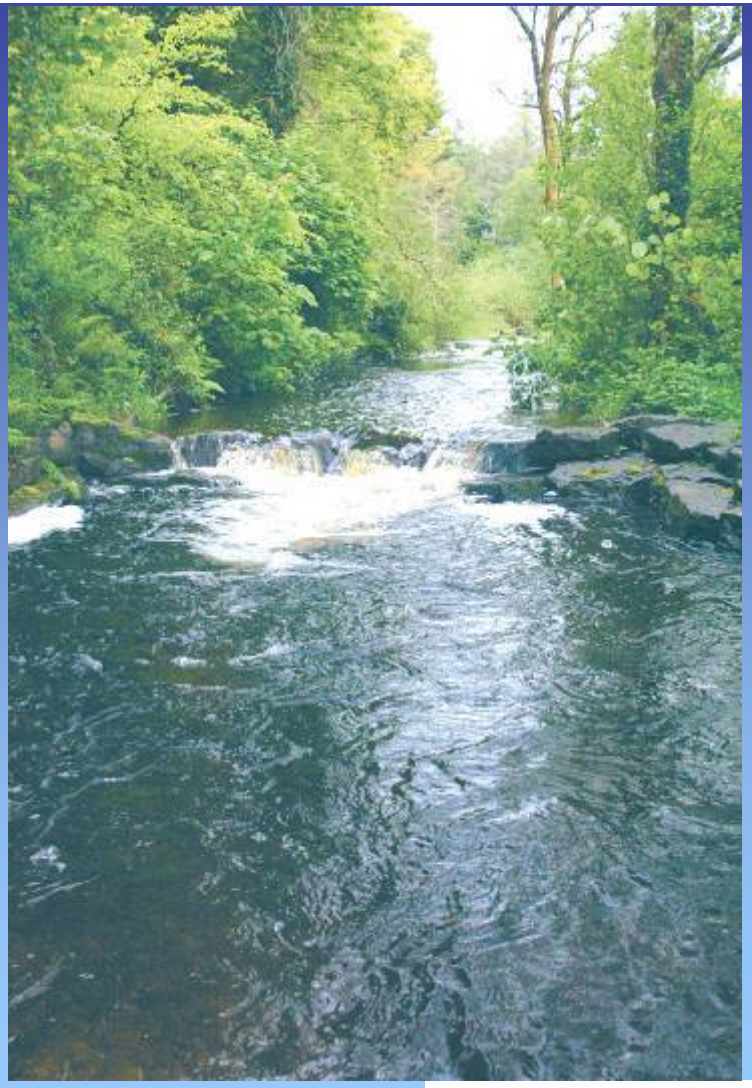
Exotic plant introduction:

Lagarosiphon (S. Africa)

“chocking" some lakes.

The Big Debate

Hatcheries Vs. Habitat Enhancement



In Europe this debate is over. Why ?

Iascach Intíre Éireann
Inland Fisheries Ireland

The value of stocking brown trout in Ireland

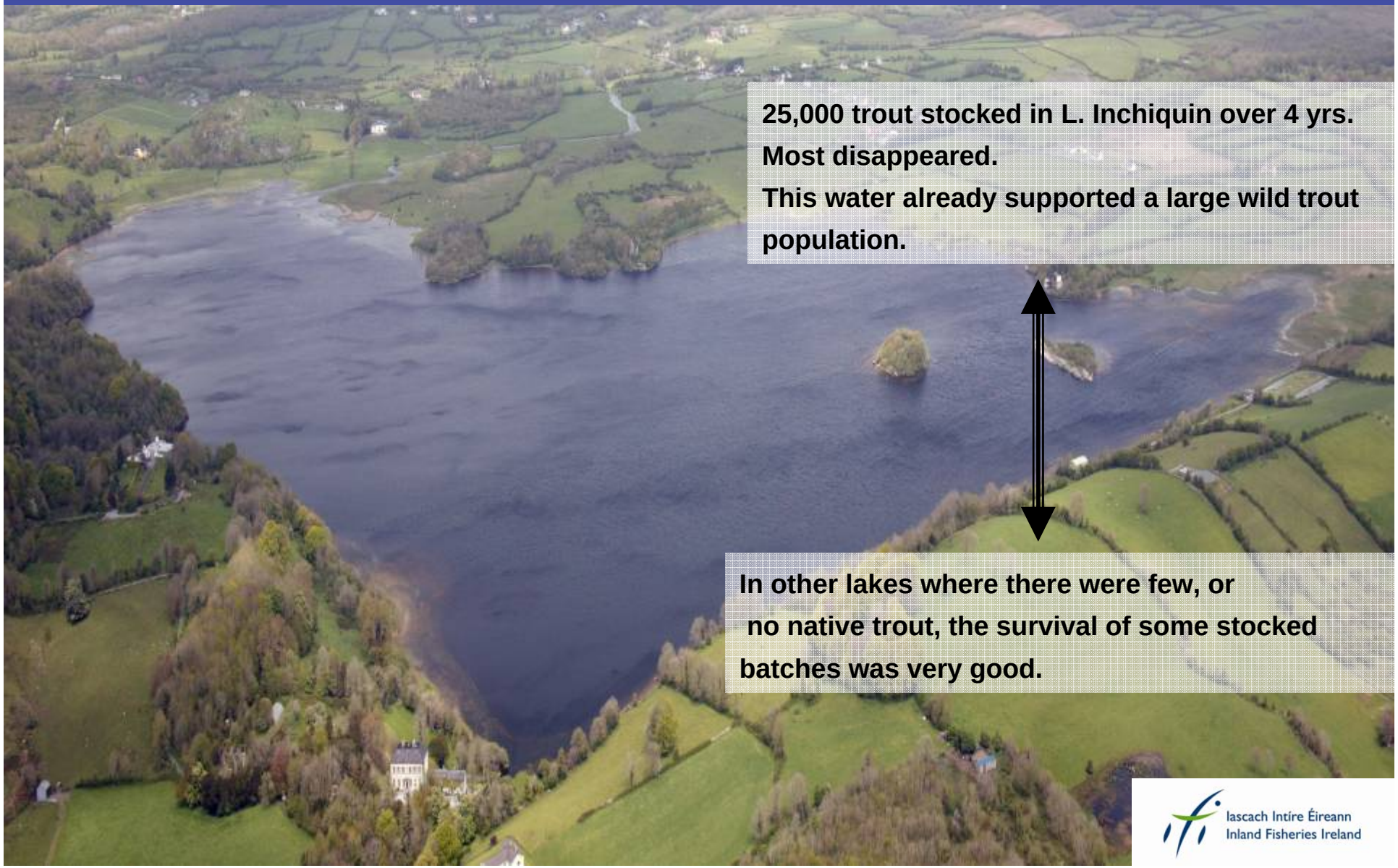
Key questions:

1. Is stocking useful?

2. If so, in what circumstances?

Iascach Intíre Éireann
Inland Fisheries Ireland

8 year study: tagging and monitoring the survival and angling catches of 500,000 trout stocked in a range of waterways.

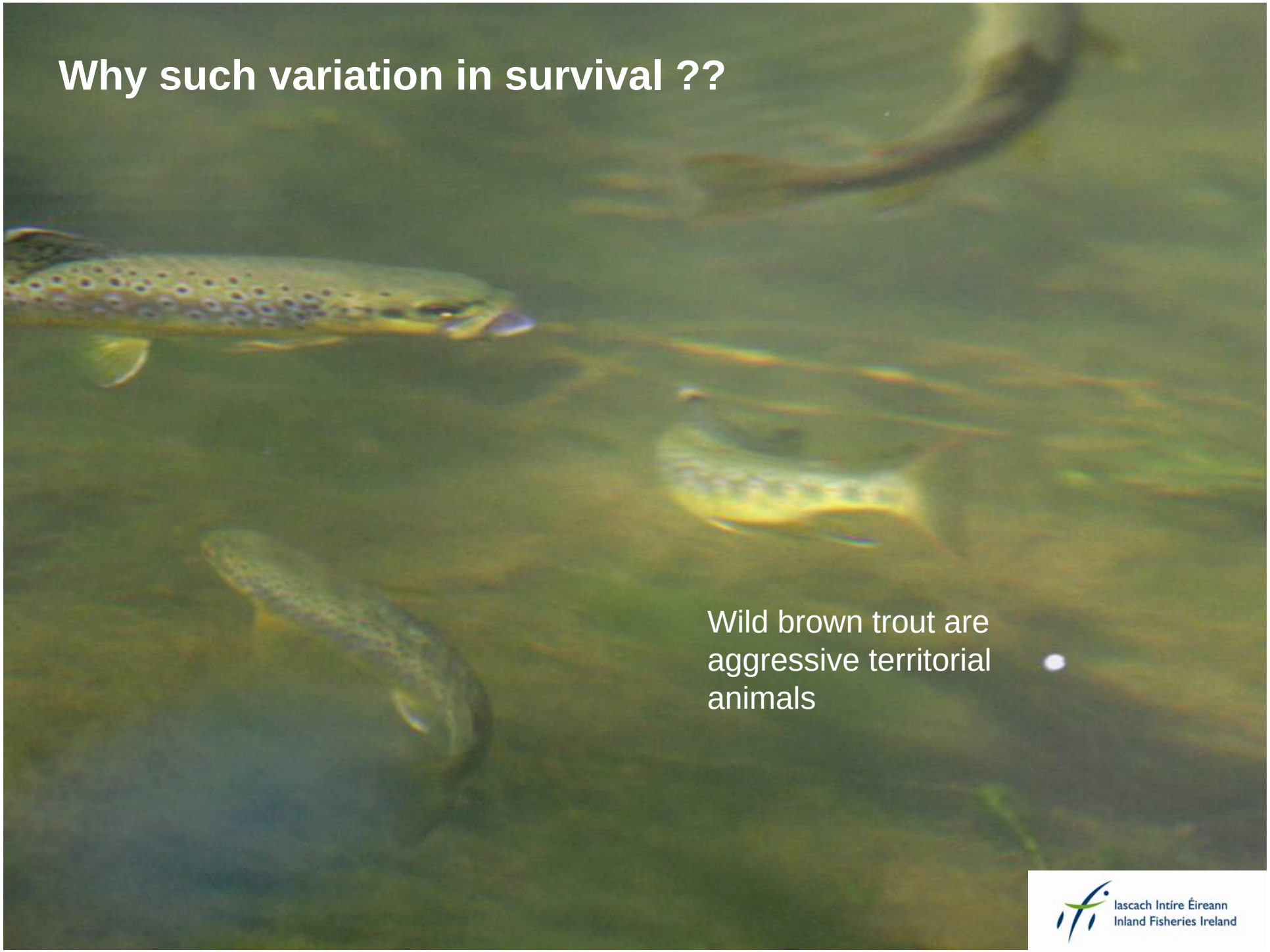


25,000 trout stocked in L. Inchiquin over 4 yrs. Most disappeared.
This water already supported a large wild trout population.

In other lakes where there were few, or no native trout, the survival of some stocked batches was very good.

Iascach Intíre Éireann
Inland Fisheries Ireland

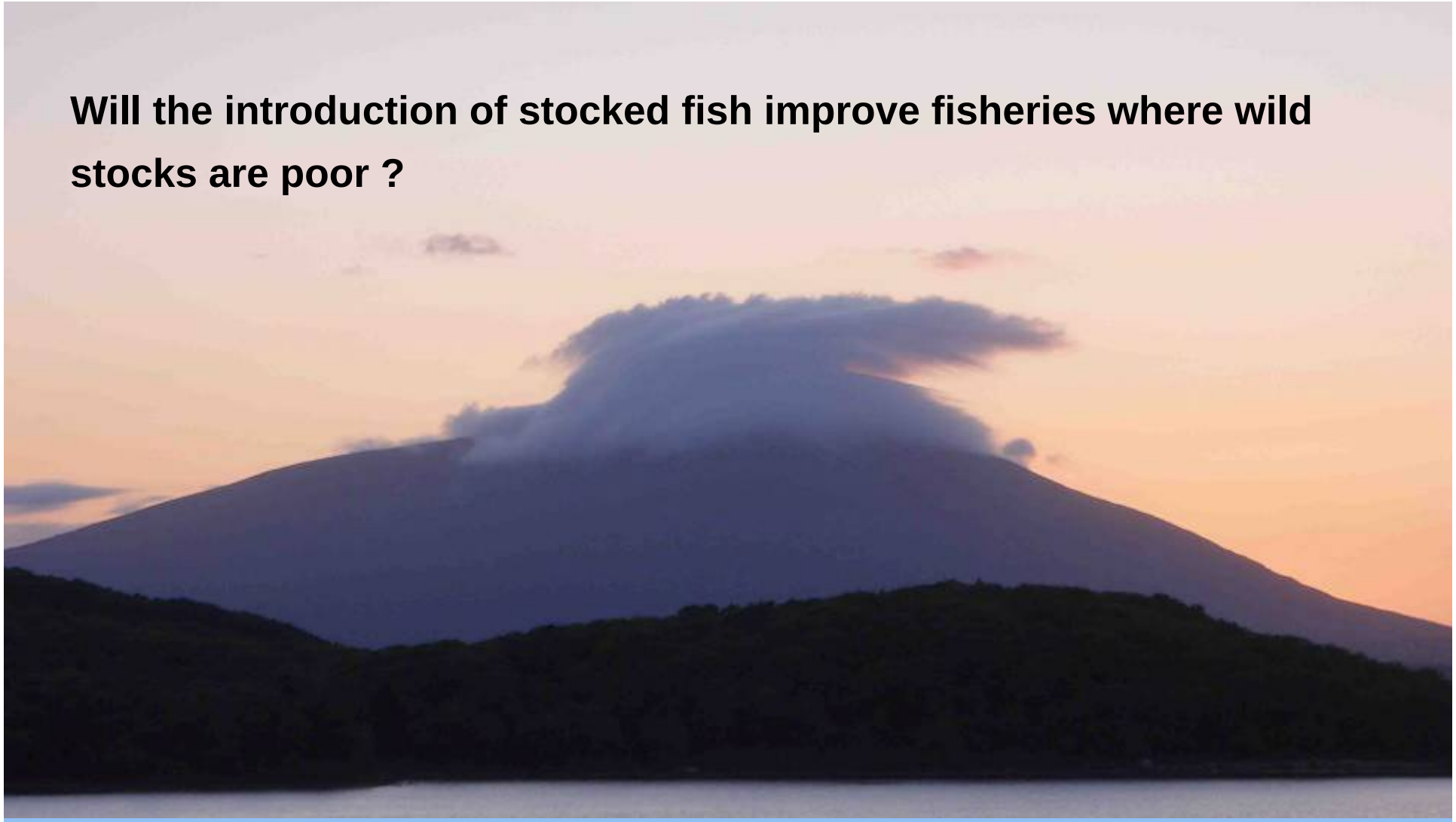
Why such variation in survival ??



Wild brown trout are aggressive territorial animals

Iascach Intíre Éireann
Inland Fisheries Ireland

Will the introduction of stocked fish improve fisheries where wild stocks are poor ?



A lack of wild fish <u>does not mean</u> that there is “more room" for stockies – it is more likely that one or more ecological changes are limiting the carrying capacity of the fishery – usually pollution, habitat degradation, water abstraction or, simply, over fishing are responsible.

Stocking will not address one, or any combination of these problems.

Iascach Intíre Éireann
Inland Fisheries Ireland

Wild trout were “stocked” into fish farm conditions

What happened?

All of these fish died after a 6 week period !!!

Hatchery fish and wild fish are very different animals

Iascach Intíre Éireann
Inland Fisheries Ireland

No evidence to indicate stocked brown trout make any long term contribution to riverine populations in Ireland. Why?

- Stocked fish can not compete with native wild fish.
- In rivers where the habitat is damaged and wild fish numbers are poor as a consequence, adding stockies never helped – they failed to survive in significant numbers.

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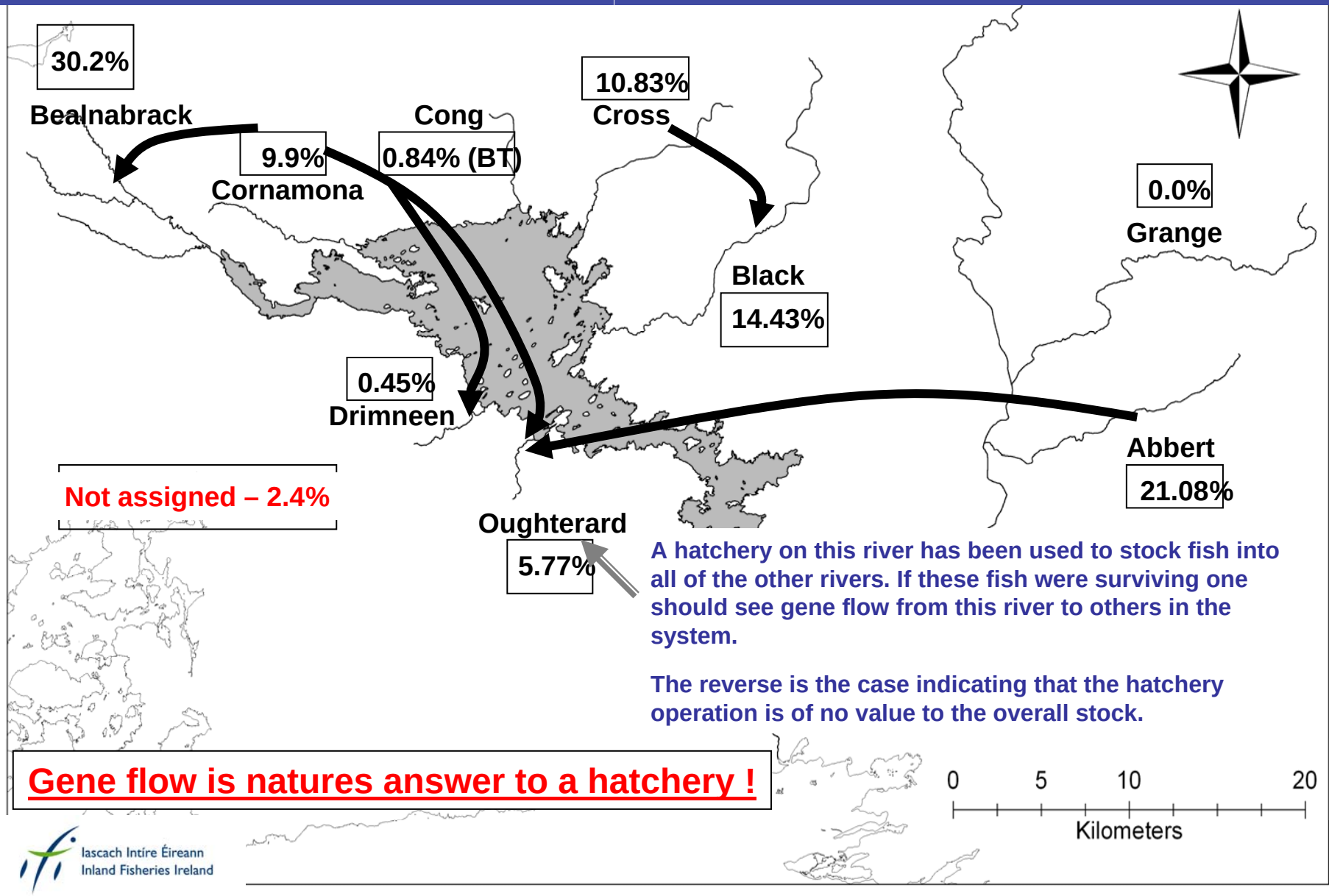
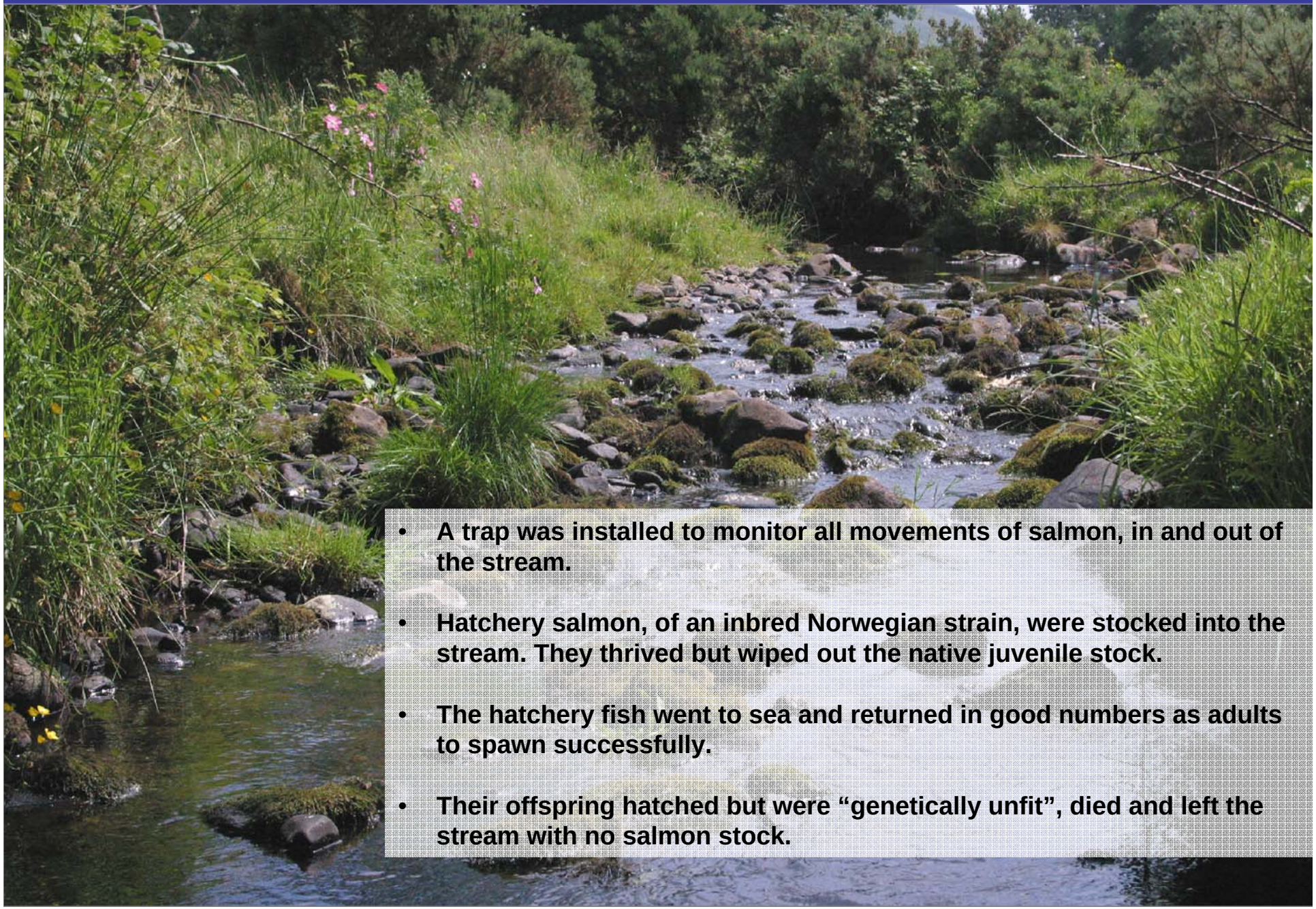
Micro-satellite DNA studies of trout stocks in Ireland highlight the fallacy that hatcheries are useful. Gene flow proves the point.



A 30 yr salmon stocking experiment



- A trap was installed to monitor all movements of salmon, in and out of the stream.
- Hatchery salmon, of an inbred Norwegian strain, were stocked into the stream. They thrived but wiped out the native juvenile stock.
- The hatchery fish went to sea and returned in good numbers as adults to spawn successfully.
- Their offspring hatched but were “genetically unfit”, died and left the stream with no salmon stock.

Japanese fishery scientists studying the impact of hatchery stock on wild pacific salmon species have come to the same conclusions

1960s: American Fisheries staff noted that the stocking of rivers in Montana on the eastern side of the Rocky Mountains with Cutthroat Trout from hatcheries on the western side of the Rockies resulted in a decline, not an increase, in stocks in the recipient rivers.

The introduction of some Atlantic coastal strains of brown trout to Mediterranean rivers have lead to the extinction of local native strains

The economics of habitat enhancement Vs stocking

(comparative studies)

	Project	Expenditure	Cost per additional adult salmon returning to the river over 25 yrs	Other gains
Habitat Enhancement	An enhancement program, a combination of riparian and instream measures	€ 160,000	€ 2.14	27,700 trout per annum Wildlife benefits
Stocking	Stocking of salmon from a hatchery	€ 160,000	€ 30.0	None

A comparison – key findings

The habitat enhancement option:

- **at least 15 times more effective**
- **provides additional major gains for other fish species and all wildlife living in the river corridor**
- **these programmes can not alter the genetics of natural populations.**

The stocking option:

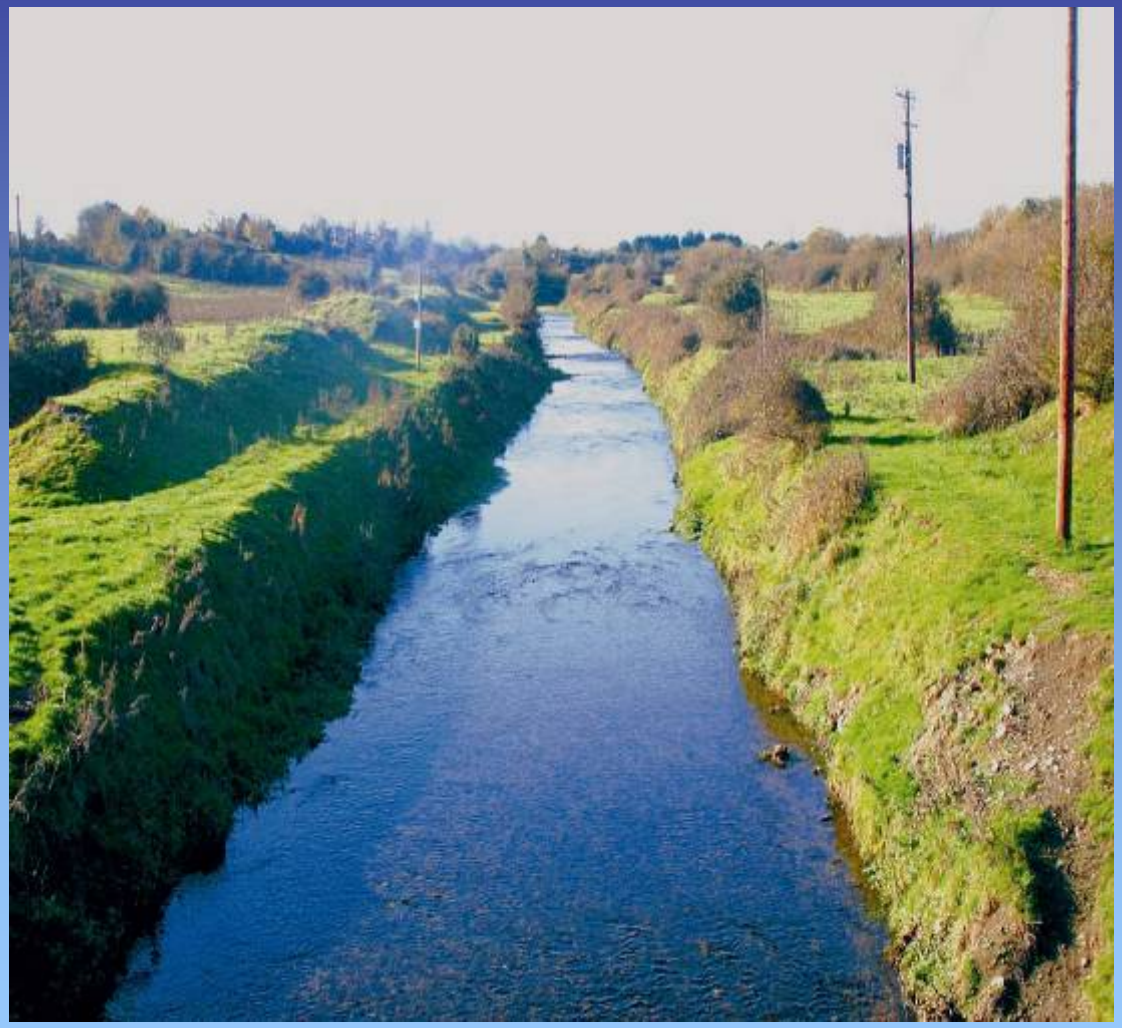
- **by far, the more expensive option**
- **no benefit to other fishes**
- **may seriously alter the genetics and/or lead to the extinction of the native population.**

Irish fisheries personnel accepted habitat enhancement programmes were the correct strategy.

Substantial funds expended in this area since 1995 (circa 50M $Au).

Habitat Enhancement Programmes

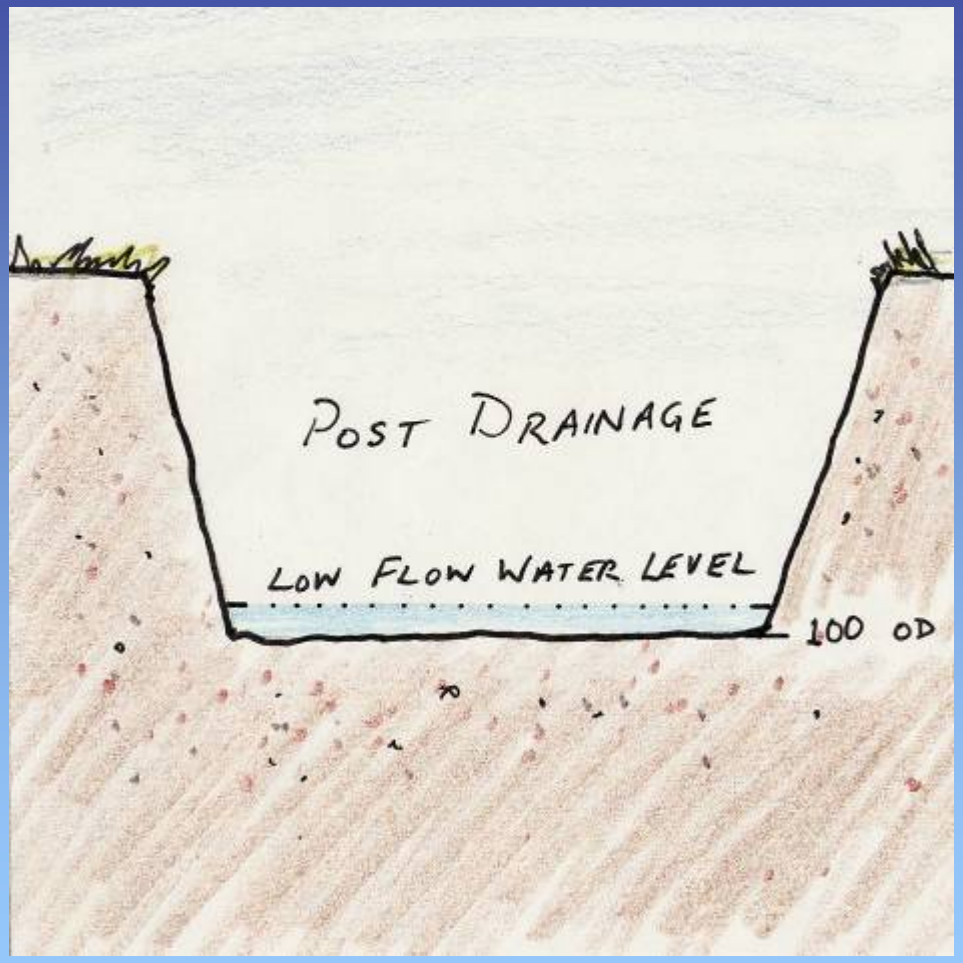
A typical drained channel 30 years after works:

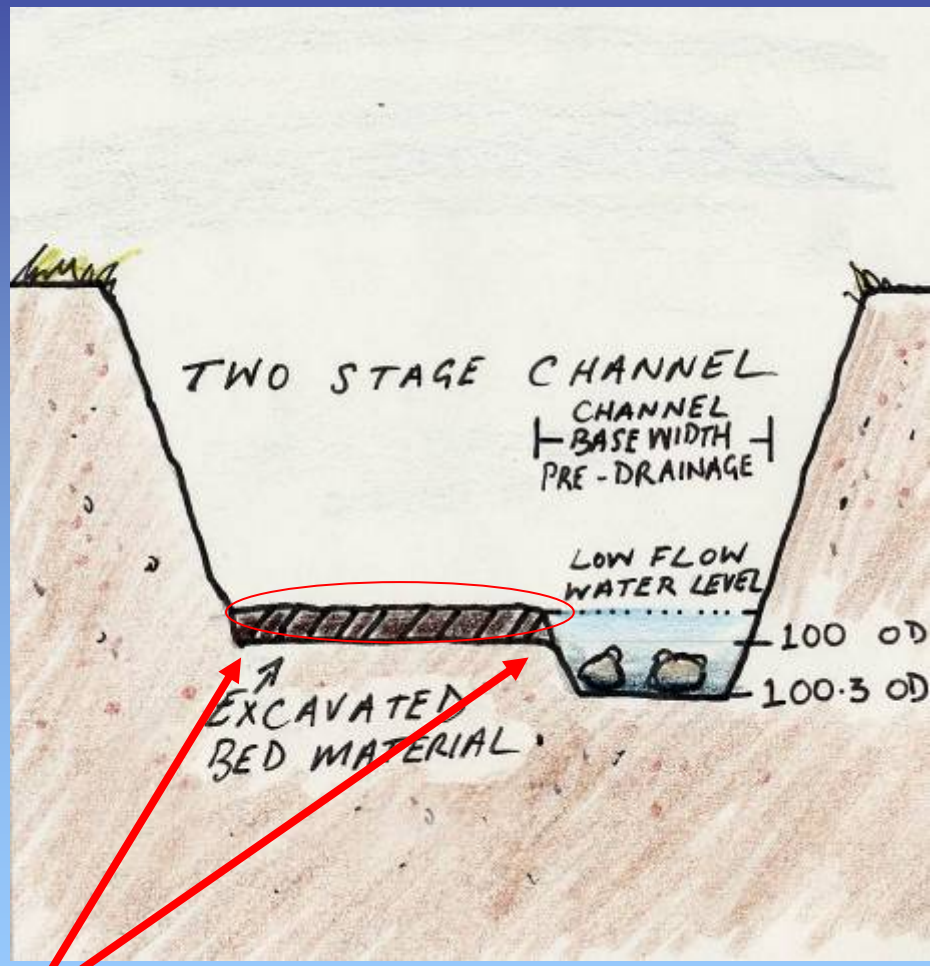


- no thalweg
- a repetitive, shallow, riffle/glide sequence with no pools
- artificially wide
- a poor riparian zone
- no in stream features (rocks or logs)
- no stock-proof fencing

The compromise: a two stage channel

The cross sectional area to bank full does not change, post enhancement.

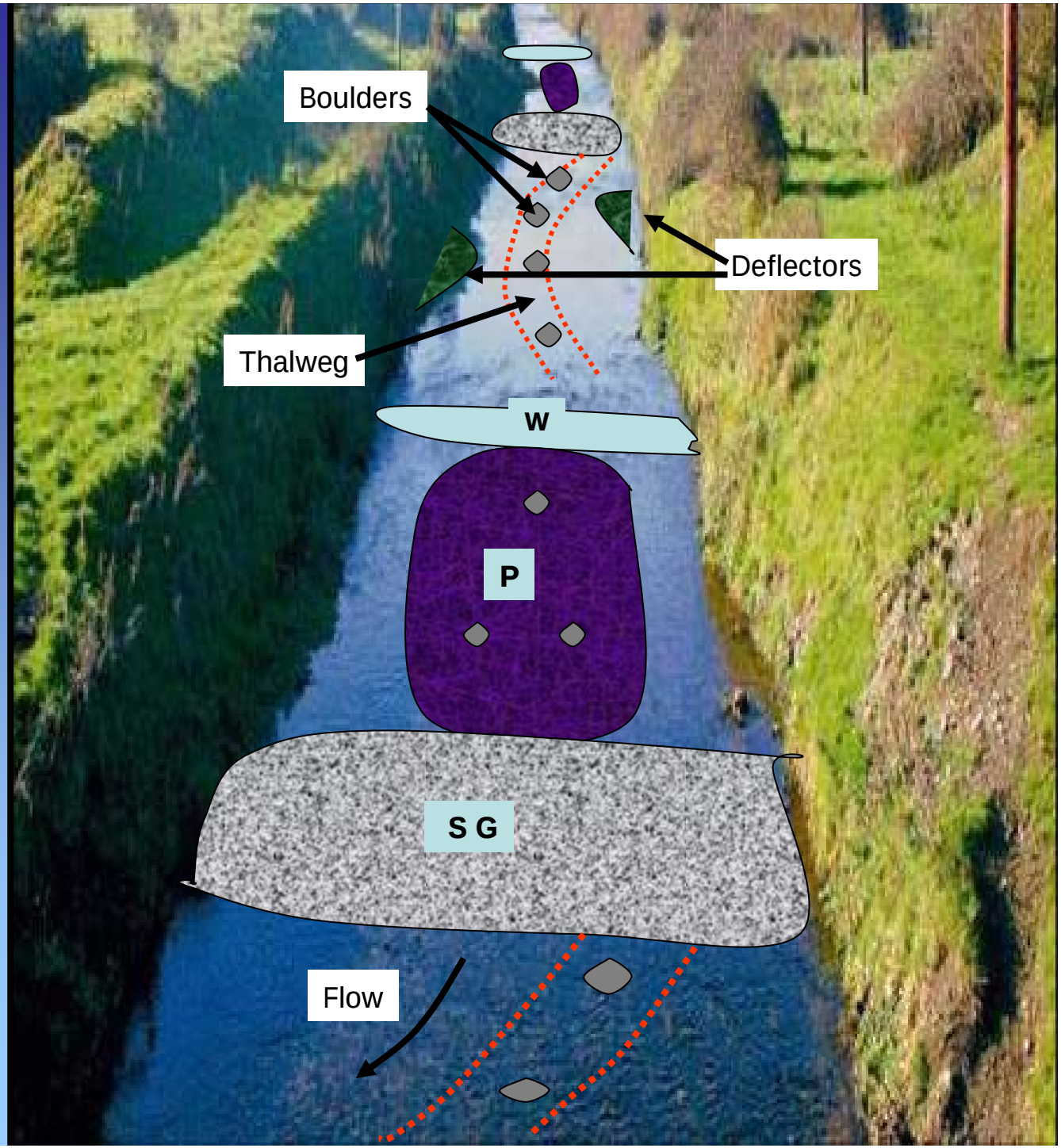




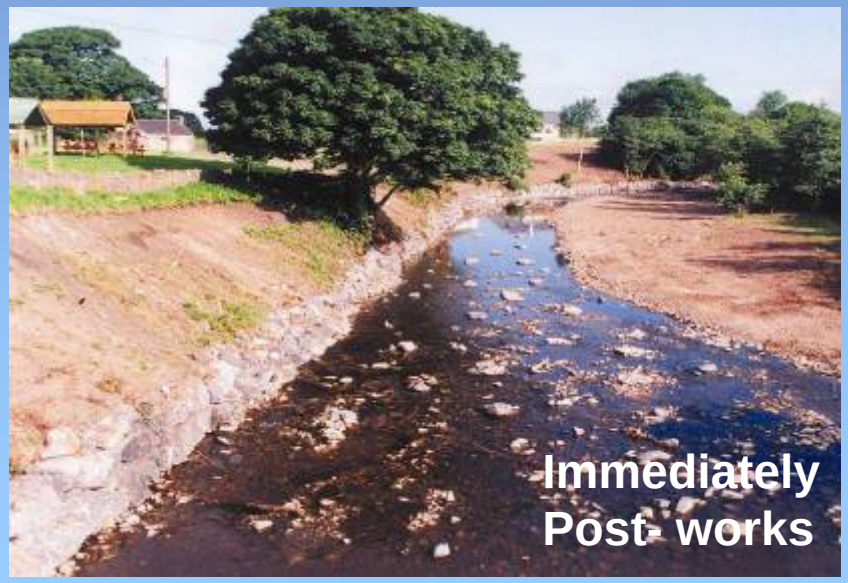
Control of silt levels here should they become excessive in relation to the flood discharge function of the channel.

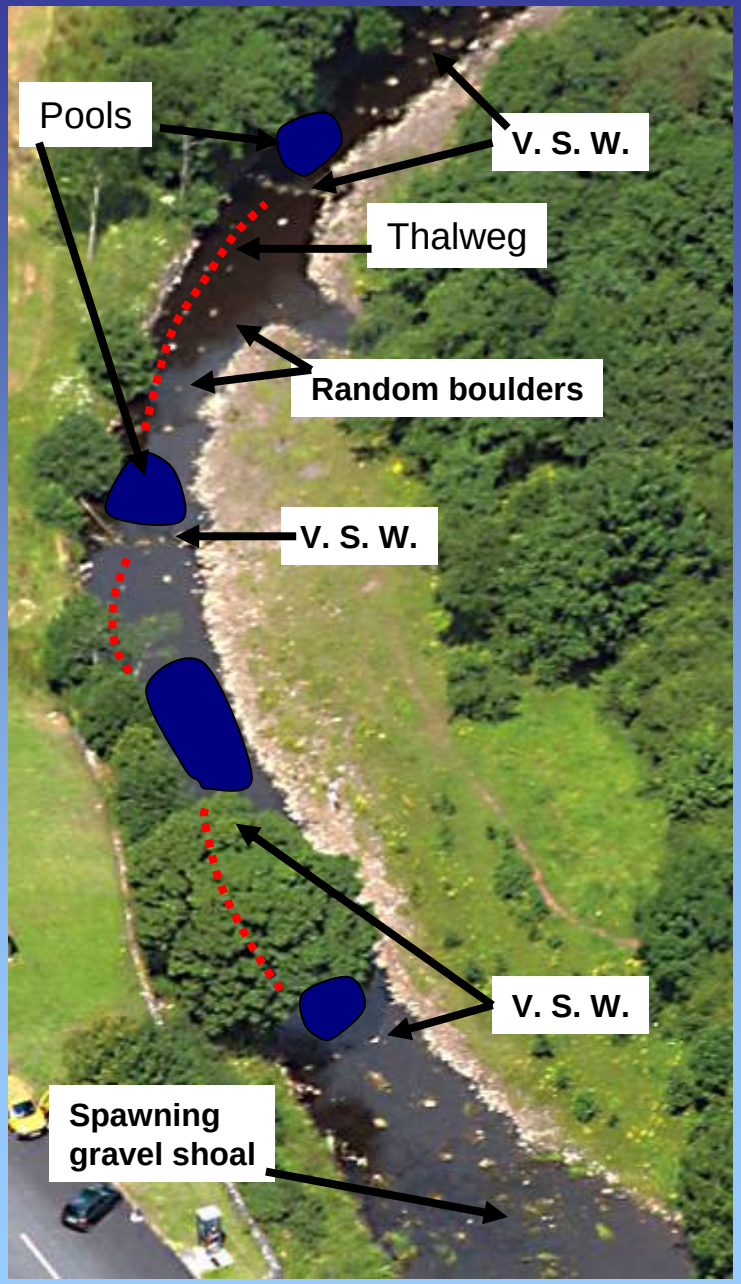
How do we repair straight drained channels?

- build weirs
- excavate pools
- place deep gravel shoals at the tail of pool areas
- excavate a thalweg through glide areas and place boulders in this area
- stabilise banks where there are erosion problems
- fence out stock and plant trees where required



Equally achievable on small, large straight or meandering channels





Channel extras:

- Construction of weir/pool/gravel shoal complexes
- Placement of a large gravel spawning shoal at the top of the section
- Excavation of a thalweg through the glide zones
- Placement of random boulders

Works result in a <u>20 fold</u> increase in fish numbers & a maintenance of the channel's flood relief capacity

Bank Revetment Techniques:

- Log/xmas tree
- Log/rock
- Riprap
- Riprap & bank cover
- Riprap in low gradient channels

Log/xmas tree revetment – a favoured bank protection option


Pre Works


7 years later


18 years on


Attempt to protect this badly
eroding bank with river gravel


Gravel removed, replaced with
rip rap and fenced


18 years later


Badly eroded bank was rip rapped with willow slips “layered” between the rock.
Bank fenced off.
Channel braiding was repaired
18 years later

Fencing is a crucial part of all enhancement programmes

Stock in Ireland love to eat aquatic and semi-aquatic plants!

Sometimes “stock-proof” fences fail to keep the sheep out

Fenced and planted 18 years ago.

The new breed of Irish “flying sheep" are responsible for our problems here.

We have monitored and quantified the effectiveness of 100's of projects over many years.

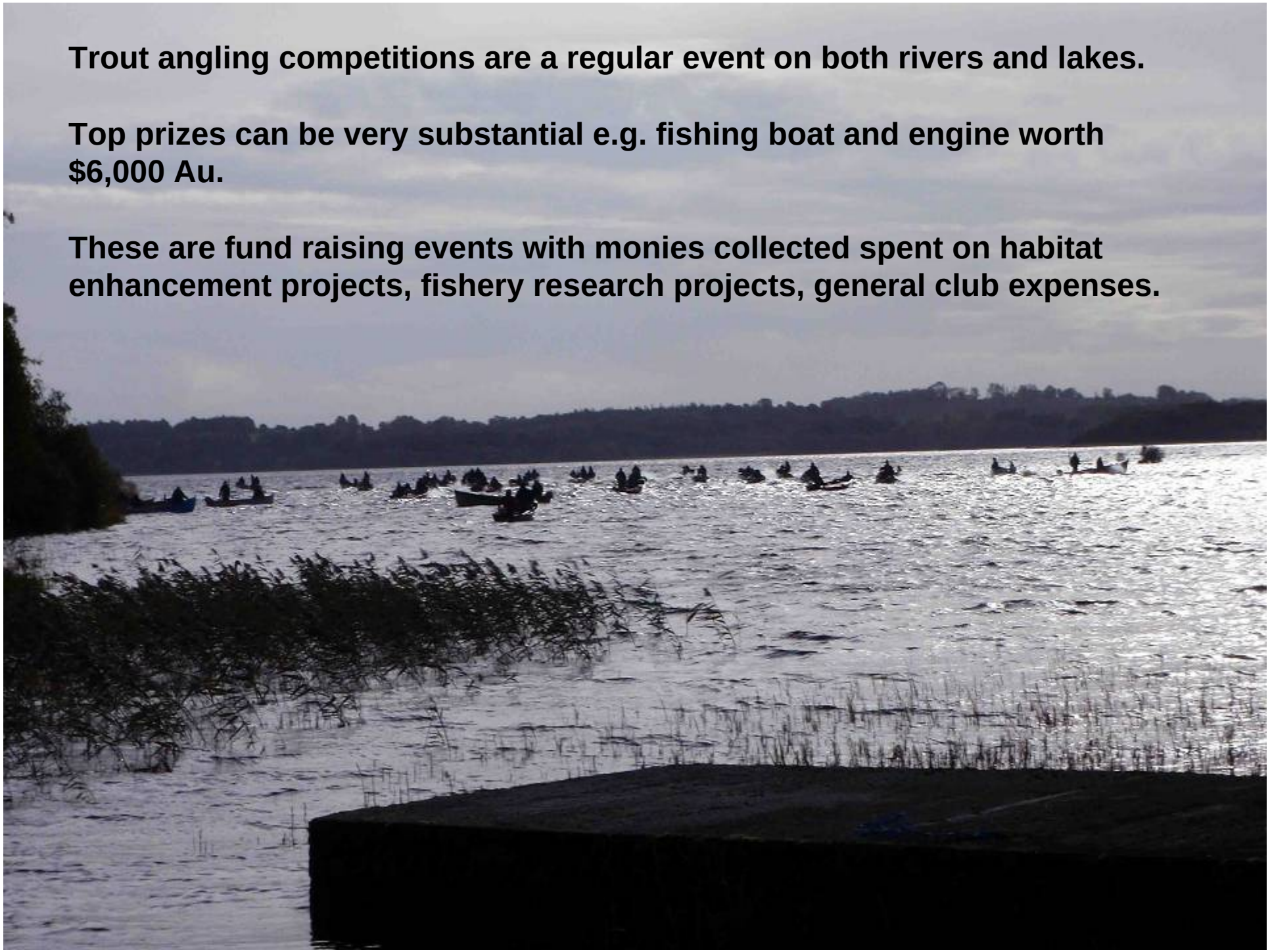
They have been consistently successful.

In Ireland I would expect that these programmes, involving the State Fisheries Service, landowners and anglers will continue into the future.

Funding Sources

There are many and varied funding sources including:

- **The European Union (a ‘federal’ source)**
- **National Government allocations**
- **Contributions from angling clubs and federations**
- **Donations from corporations and wealthy individuals**



Trout angling competitions are a regular event on both rivers and lakes.

Top prizes can be very substantial e.g. fishing boat and engine worth $6,000 Au.

These are fund raising events with monies collected spent on habitat enhancement projects, fishery research projects, general club expenses.

Thank you all for listening.

Dr O'Grady was a special guest of the Conservation Action Unit, NSW Department of Primary Industries

This presentation was given at the 2011 Fishers for Fish Habitat Forum, Tamworth NSW

Technical information presented can be found in published peer review articles

Dr O'Grady's presentation was a broad ranging talk on current fishery priorities in Europe and the current Irish and international views in relation to the merits of habitat enhancement and stocking issues. He emphasized that inland fishery policy in Europe is currently "driven" by the Water Framework Directive – a European Union Directive now adopted by all States within the Union. Priorities, under this directive, can be summarized as follows;

- **Water Quality.**
- **Habitat Restoration.**
- **Restoring Connectivity.**
- **Re-establishment of native species where they have become extinct.**
- **A ban on stocking non native species.**
- **Aim to confine introductions of native fishes from hatchery sources to triploid individuals.**
- **Completely change the function of hatcheries. Use them primarily as "conservation units" to enhance native stocks which are in danger of extinction.**

Dr.O'Grady highlighted essential differences between the freshwater fish fauna in NSW and Ireland in terms of their geological age – most of Ireland was glaciated only 18,000 yrs ago where as their as a fossil record for Murray Cod going back at least 26M. yrs!

He outlined the findings of major fishery research programmes in Ireland which looked at the comparative value of stocking programmes and riverine enhancement exercises. These data show that, long term, habitat improvement schemes are a far cheaper option than stocking programmes. Apart from improving the targeted species of fish the whole ecology of the river corridor will improve – other fish species, aquatic plants and invertebrates, birds, bats and all other life forms in the river corridor will all benefit. In contrast stocking programmes, at best, may benefit one fish species. No other life form in the river corridor will benefit from a stocking exercise. At worst, stocking can cause serious problems (see below). Dr. O'Grady provided many illustrations of habitat enhancement programmes in Ireland which illustrated the changes in the river corridor pre and post enhancement and showed how quickly nature will respond positively when given a "helping hand".

The presentation also illustrated the genetic complexity of freshwater fish stocks in relation to Irish trout populations – similar diversity has been noted in Murray Cod populations. Dr. O' Grady provided a number of examples which illustrated that stocking programmes in Ireland, Italy, the U.S. and Japan have either lead to the extinction of wild strains of salmon and trout species or the creation of undesirable hybrid populations. The examples provided clearly illustrate the fact that stocking can have very negative long-term consequences for native fish stocks. The comments in Dr. O'Grady's presentation in relation to habitat enhancement and stocking programmes reflect the current thinking in Europe and elsewhere – look at the priorities list above in relation to the Water Framework Directive.

In his closing remarks he advised the anglers to "revisit" the whole question of stocking programmes and consider rerouting all available resources to allow an expansion of the excellent habitat enhancement programme currently being carried out by NSW Department of Primary Industries, Fisheries.

Dr Martin O'Grady July 2011