

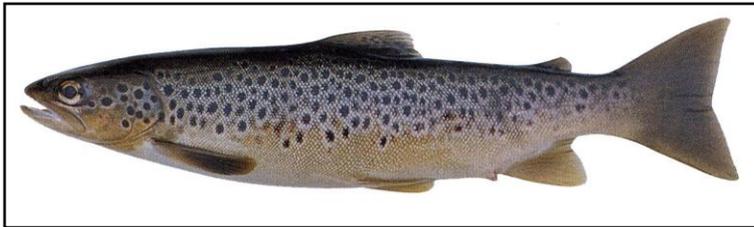
Trout Genetic Studies in Ireland – A Historical Aspect

The trout in L. Melvin ---- separate species

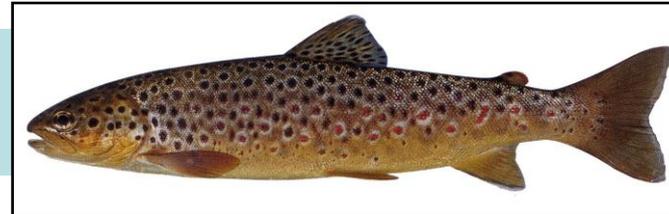
Ferox – A fish feeder



Sonaghan - feeds mainly on plankton



Gillaroo - targets snails and shrimps



Genetic Variation in Trout Stocks Generally ? Could it be a Very Useful Management Tool ?

Rye



Multeen



Bulkaun



Bandon



Fergus



Nuenna



Spanish fishery geneticists have found a close link between pigmentation patterns and discrete genetic forms of trout

Lough's Corrib and Mask Genetic Studies -2010

OBJECTIVES :

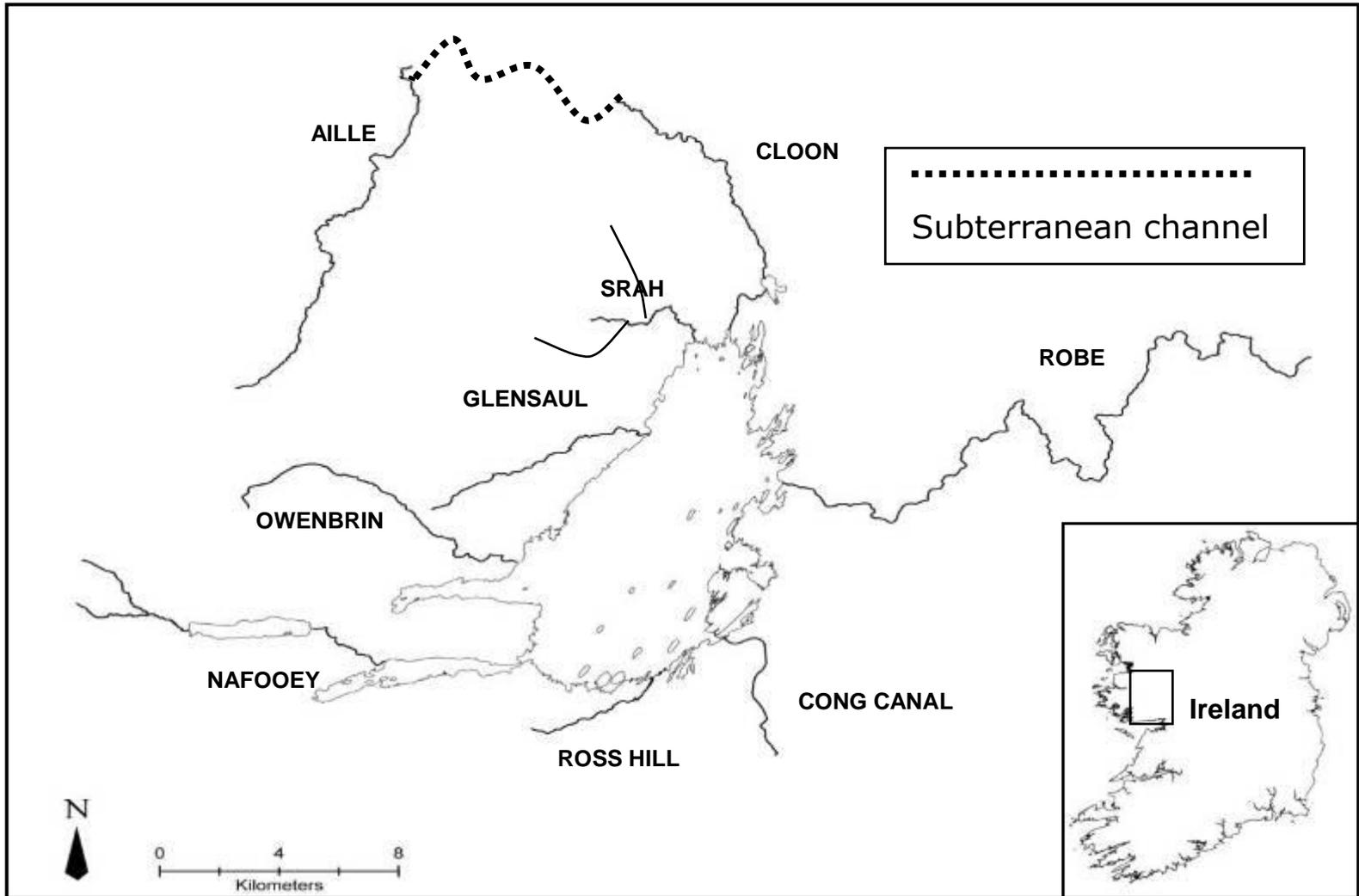
- To investigate the patterns and extent of genetic diversity in sub catchments.
- To evaluate the contribution of individual sub catchments to the adult stock in each lake.
- To look at the interrelationship of the Mask and Corrib ferox trout population.
- To see the extent, if any, to which the Mask, Corrib and Carra stocks are “intermixed” genetically.
- Establish, whether or not, there is a lake spawning population of brown trout in L.Mask.
- Evaluate the influence of a hatchery programme on L. Corrib.

Corrib and Mask Genetic Studies -Methodologies

- Fish samples collected by electro fishing.50 juveniles were fin clipped in each sub catchment,the samples preserved and sent to the genetics lab.
- With the assistance of anglers fin clips were obtained from adult fish caught in the lakes for laboratory analysis.
- Our colleague Dr. Paddy Gargan kindly provided us with additional fin clips from adult ferox trout which were radio tagged and released in both lakes.
- All samples were analysed by fish geneticist in U.C.D. using the most sophisticated genetic analysis techniques available today (micro satellite DNA testing).

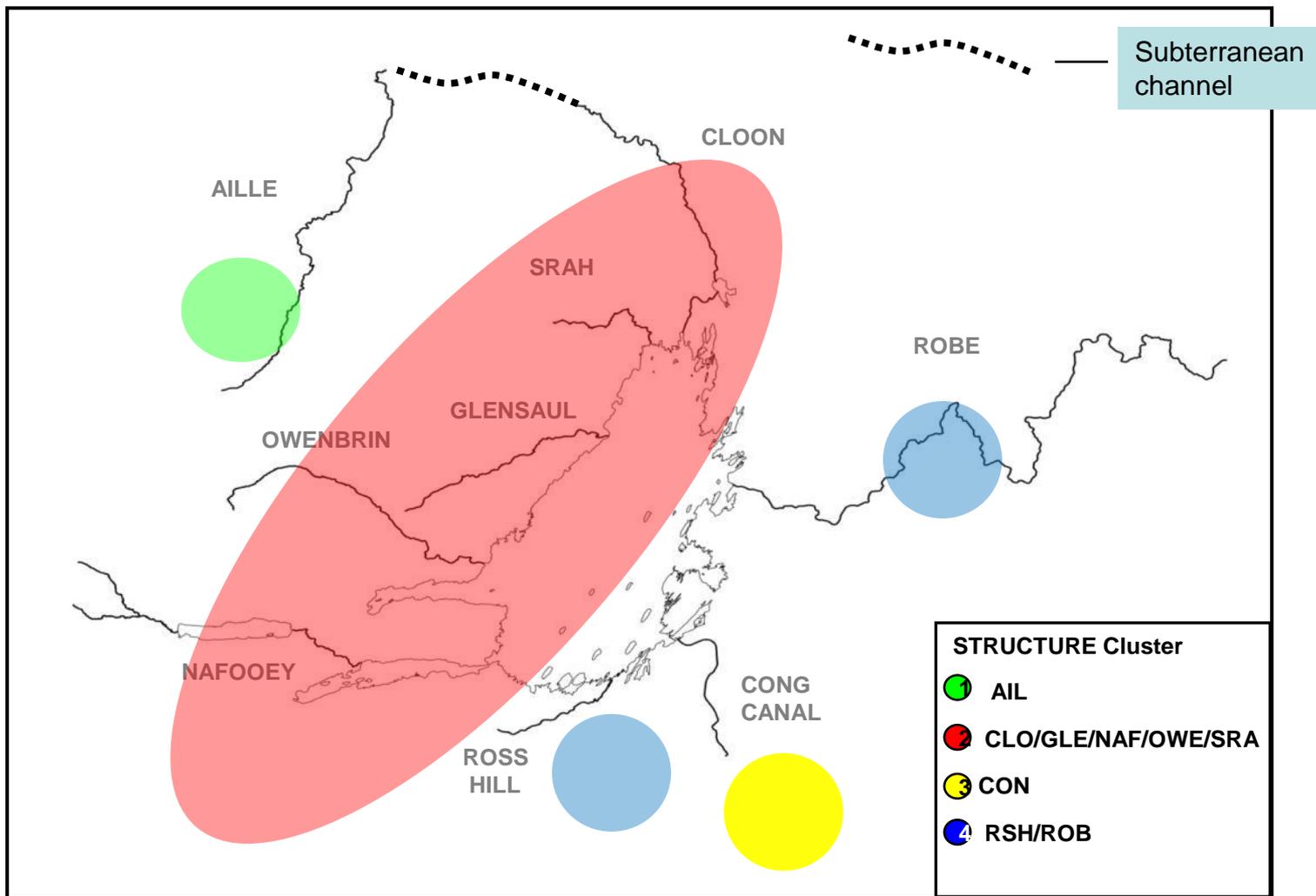


STUDY AREA: THE MASK CATCHMENT

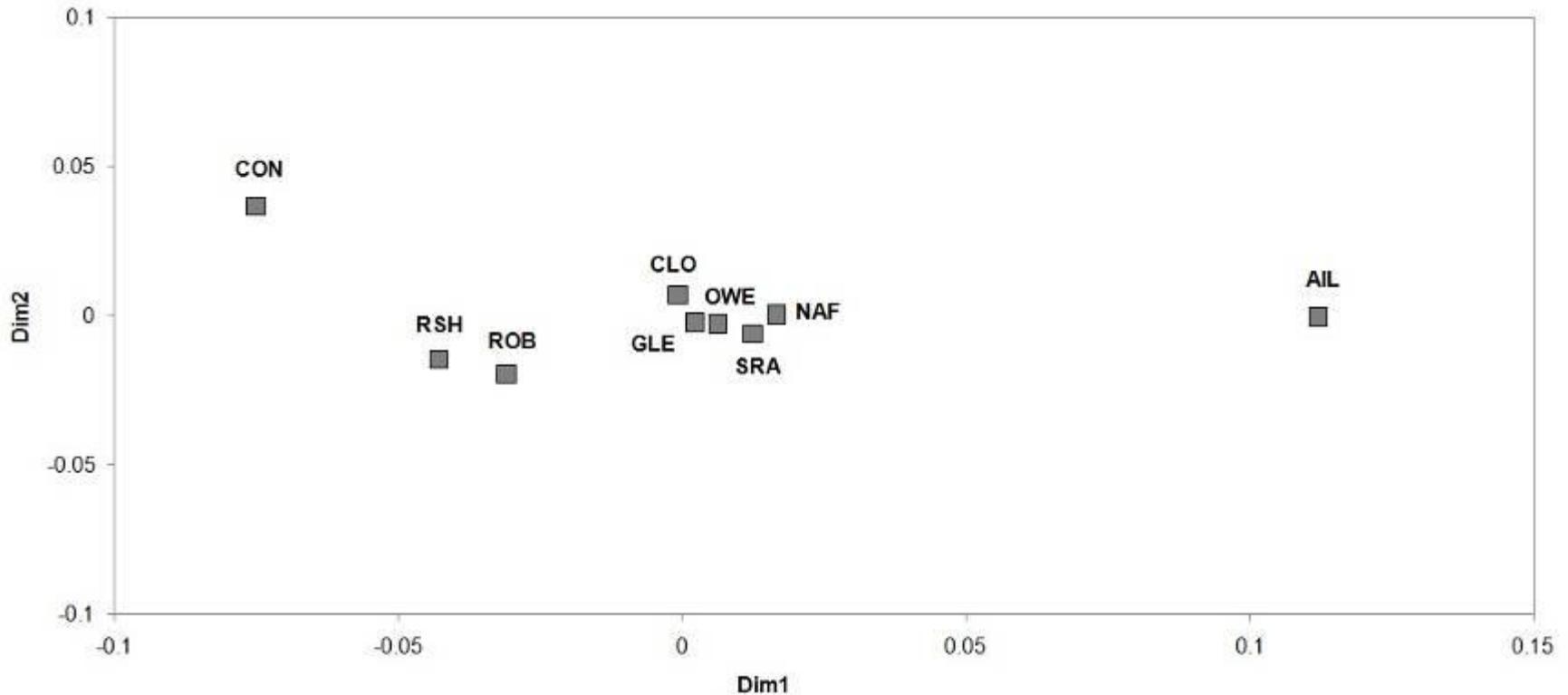


L. Mask surface area = 16286 Ha.

Number of genetic clusters - 4



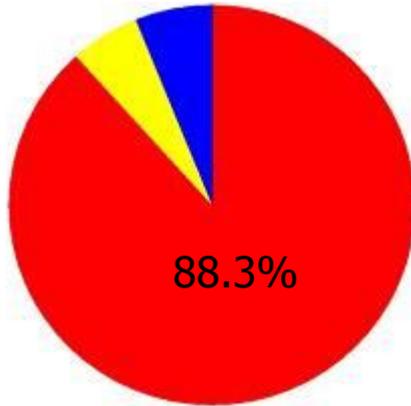
What genetic groupings do we have and how closely related are they ??



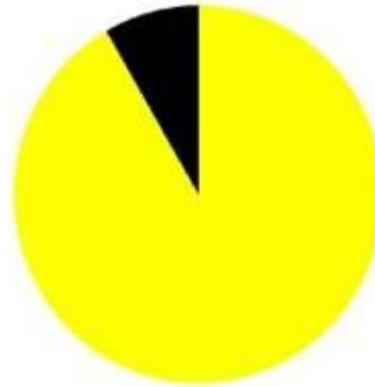
- All of the channels on the western side of the catchment are closely related.
- Aille and Cong R. stocks are very different to the other groups.
- Rosshill and Robe fish are closely related.

STOCK STRUCTURE: Structure Analysis

Mask 2010



Ferox 2010

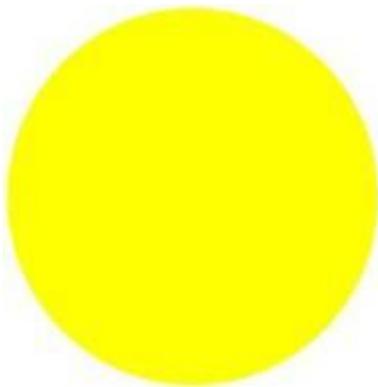


Structure Assignment

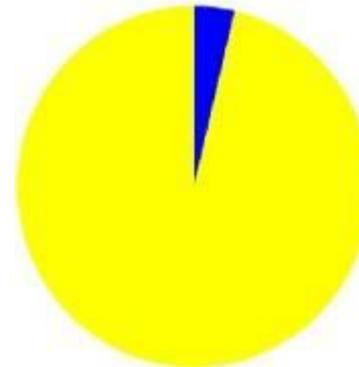
- AILLE
- WEST
- CONG
- EAST
- NOT ASSIGNED

Additional Samples of Ferox Trout collected during the radio tagging programme in 2008 and 2009 in L. Mask.

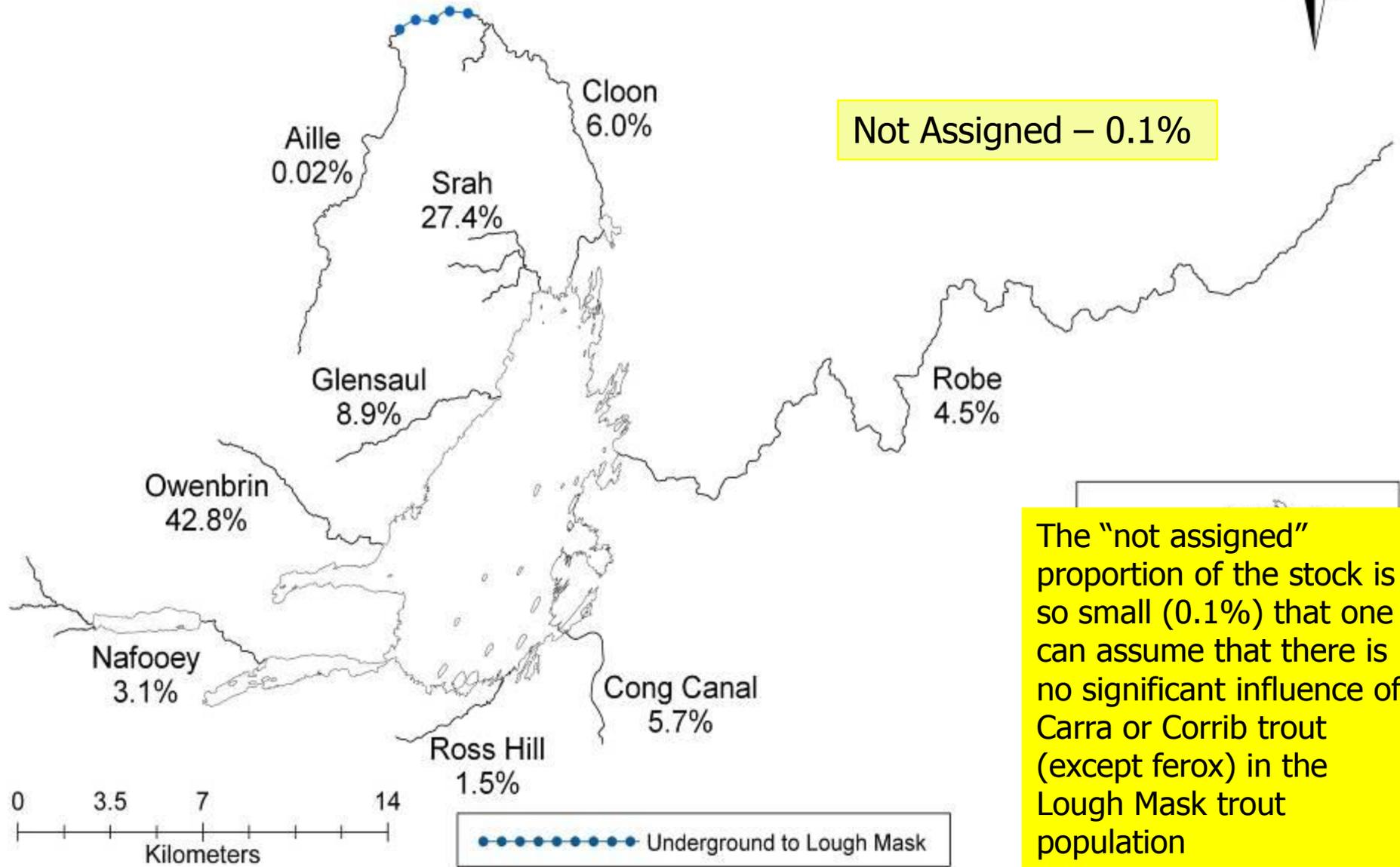
Ferox 2008



Ferox 2009



Contribution of the individual sub catchments to the adult stock in Lough Mask in 2010.

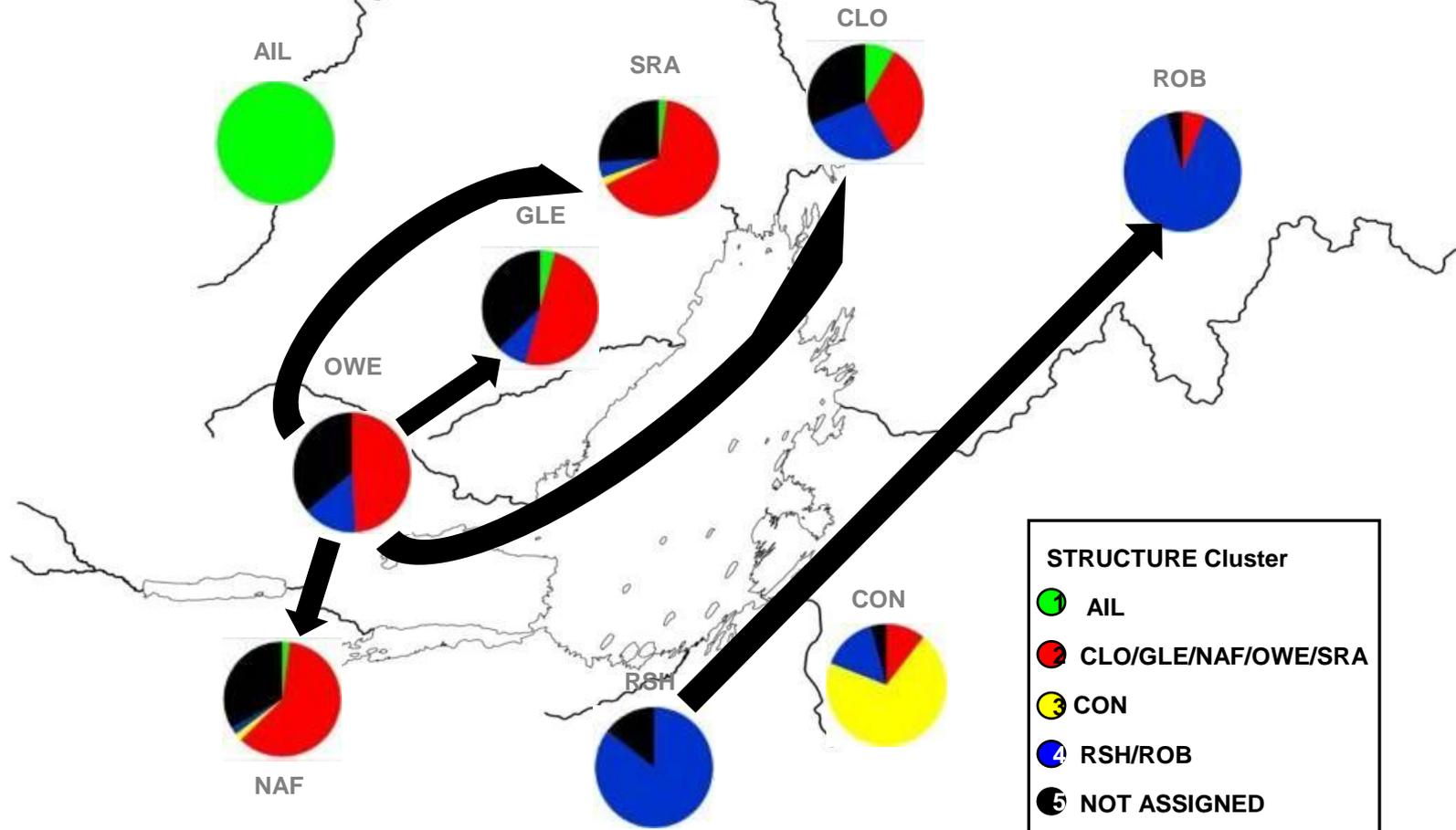


Not Assigned – 0.1%

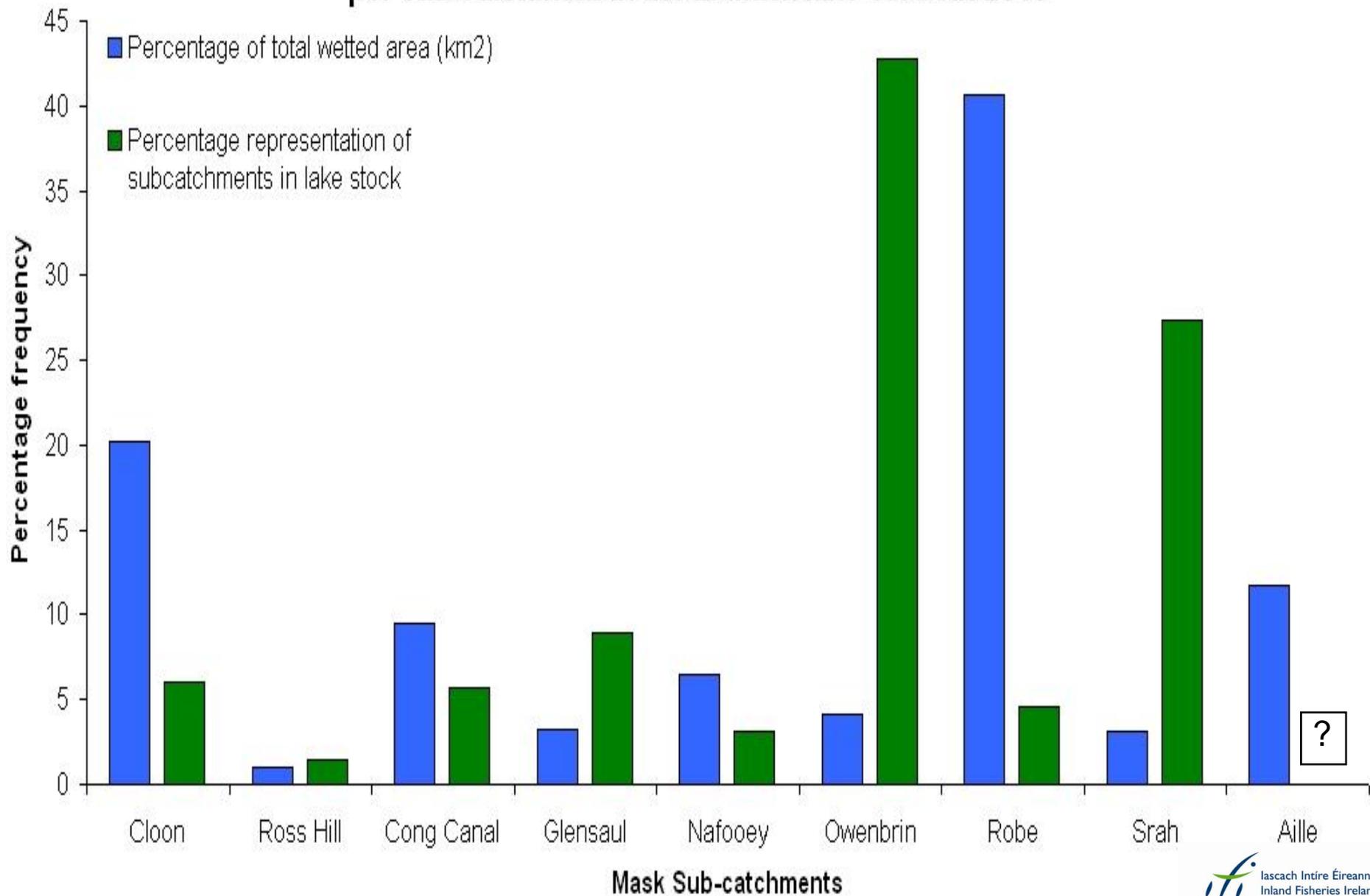
The "not assigned" proportion of the stock is so small (0.1%) that one can assume that there is no significant influence of Carra or Corrib trout (except ferox) in the Lough Mask trout population

Population Structure and Gene Flow

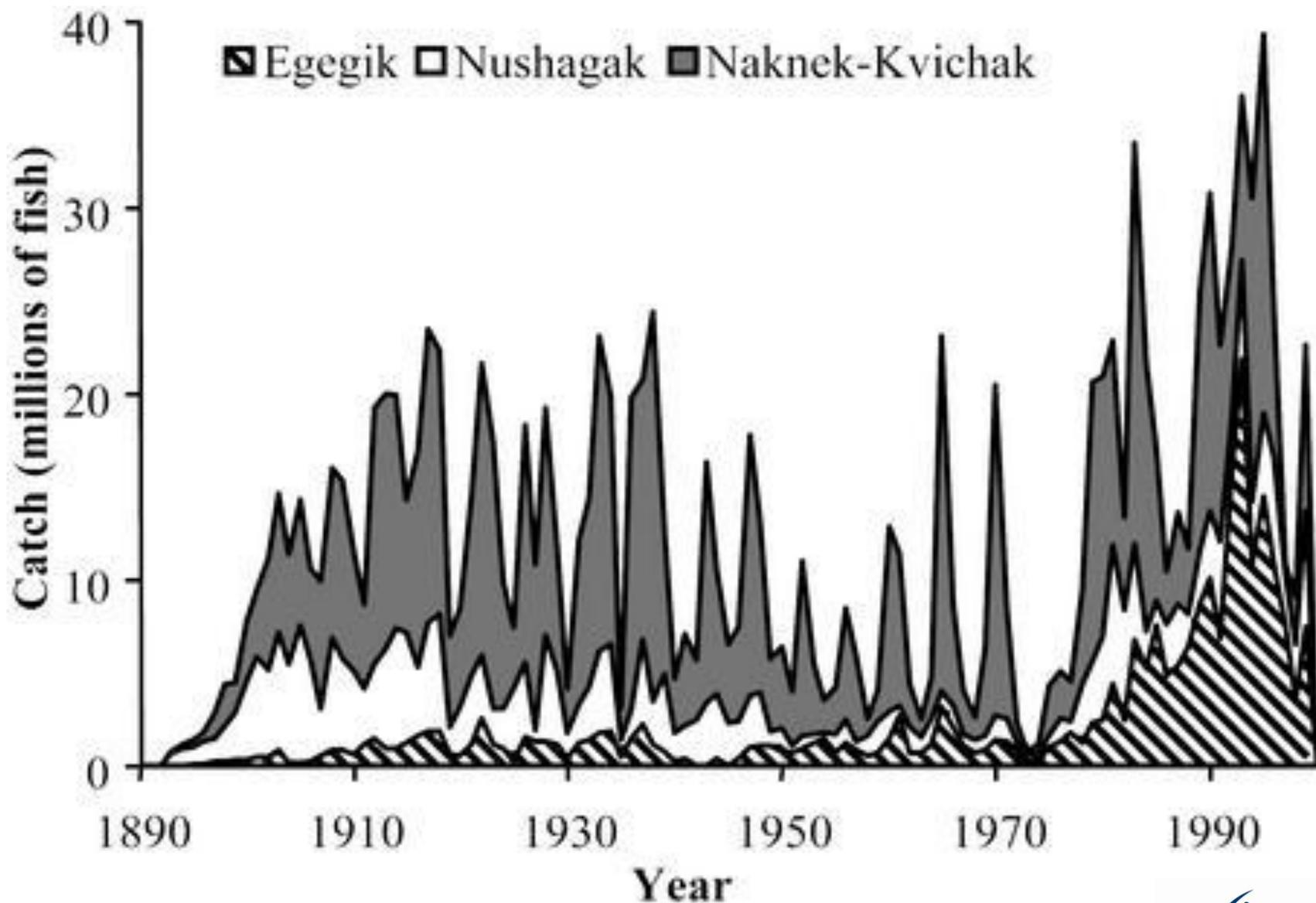
Note the presence of a small number of Aille genes in three of the western rivers.



The proportion of total wetted area per sub catchment and the proportion of trout per sub catchment in the L. Mask lake stock in 2010



Fish Stocks are fluid and can change over time.



Currently a very large trout stock in the Robe R. is being maintained, in part ,by a substantial crayfish population.

What would happen if the crayfish population collapsed???



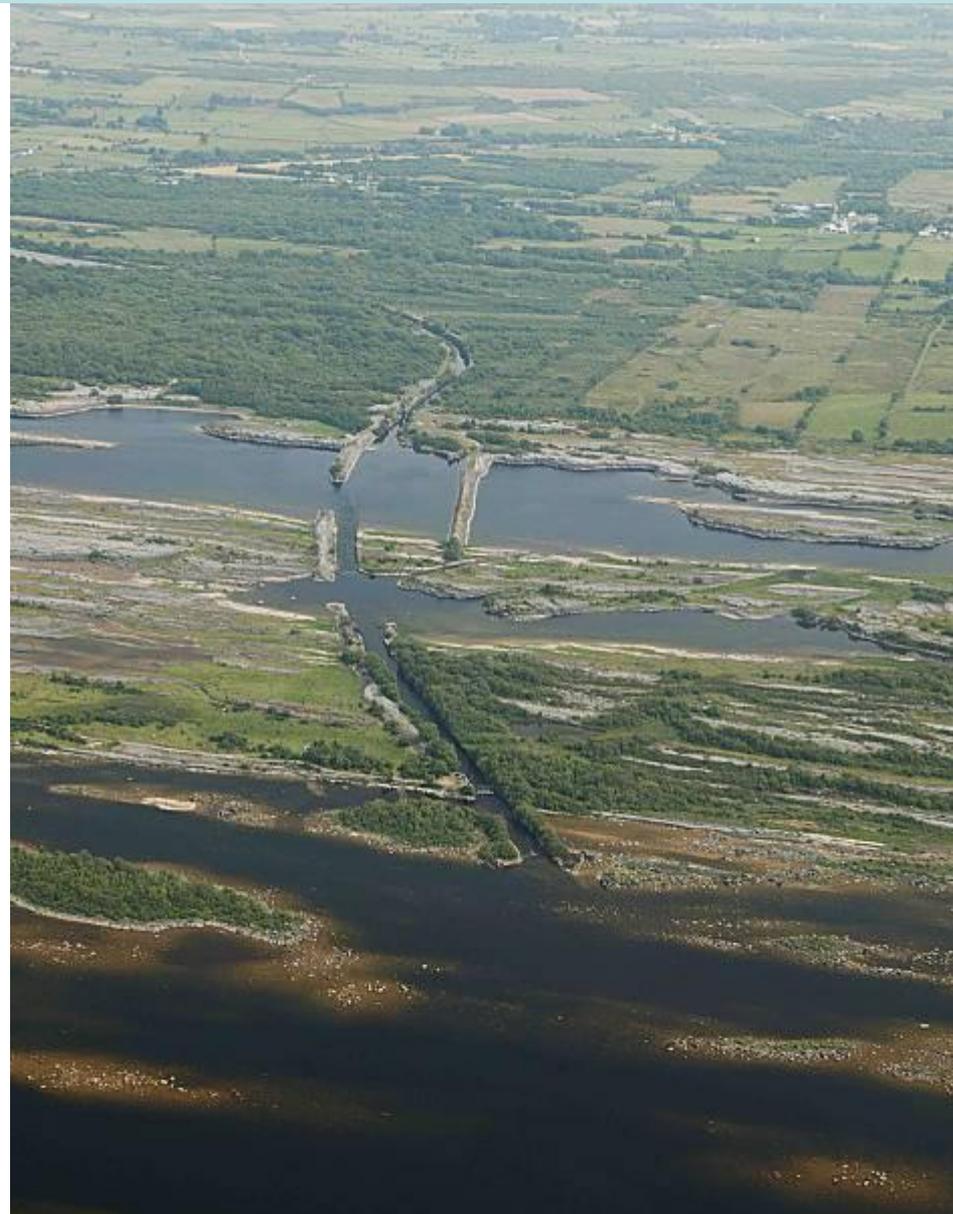


Trout in the Owenbrin R. and other western tributaries feed principally on aquatic insect larva -mostly stoneflies and mayflies. A variety of parasites could temporarily lead to a serious reduction in insect populations thereby reducing trout production.



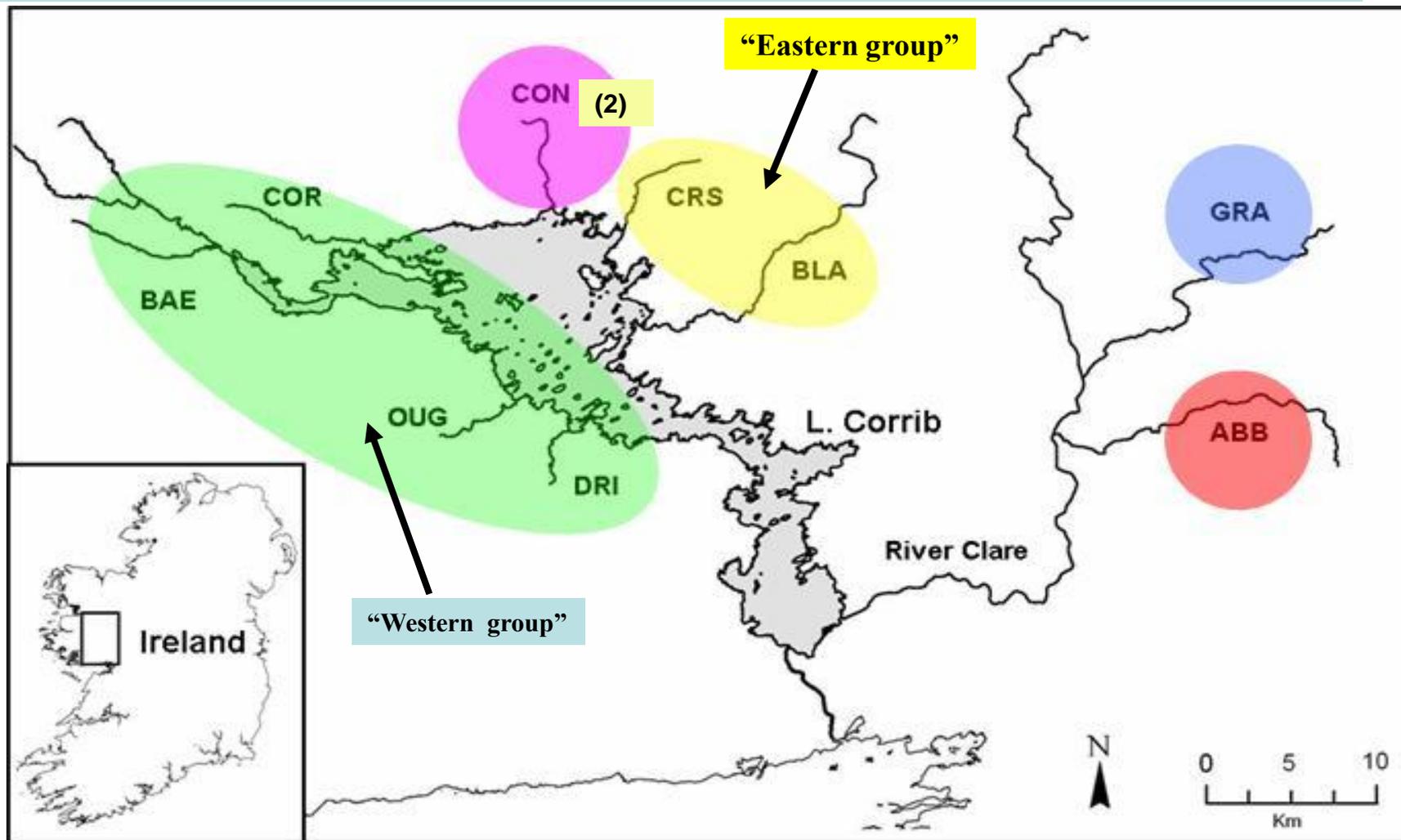
A Summary of the L. Mask Trout Genetic Study

- The adult trout stock in L. Mask is currently dominated by fish recruiting to the lake from the western tributaries – in 2010 the Owenbrin (42.8%), the Srah (27.4%) and the Glensaul (8.9%) were the principal contributors of fish to the adult lake population.
- The Robe, despite its extensive catchment size, is not making a large contribution to the lake stock (4.5%).
- No ferox trout stock was found in any of the inflowing rivers to Mask. All juvenile trout in the canal (right) were ferox type and were identical to the Corrib ferox in genetic terms. This suggests that the construction of the canal allowed the Corrib ferox fish to colonise Mask.
- Very few fish in the adult sample (0.1%) could not be assigned to one of the inflowing rivers or the canal. This means that Corrib trout (apart from ferox fish) and Carra fish are not contributing to adult stocks in Mask. It also means that there is not a separate population of trout spawning on the gravel shoals around the islands.



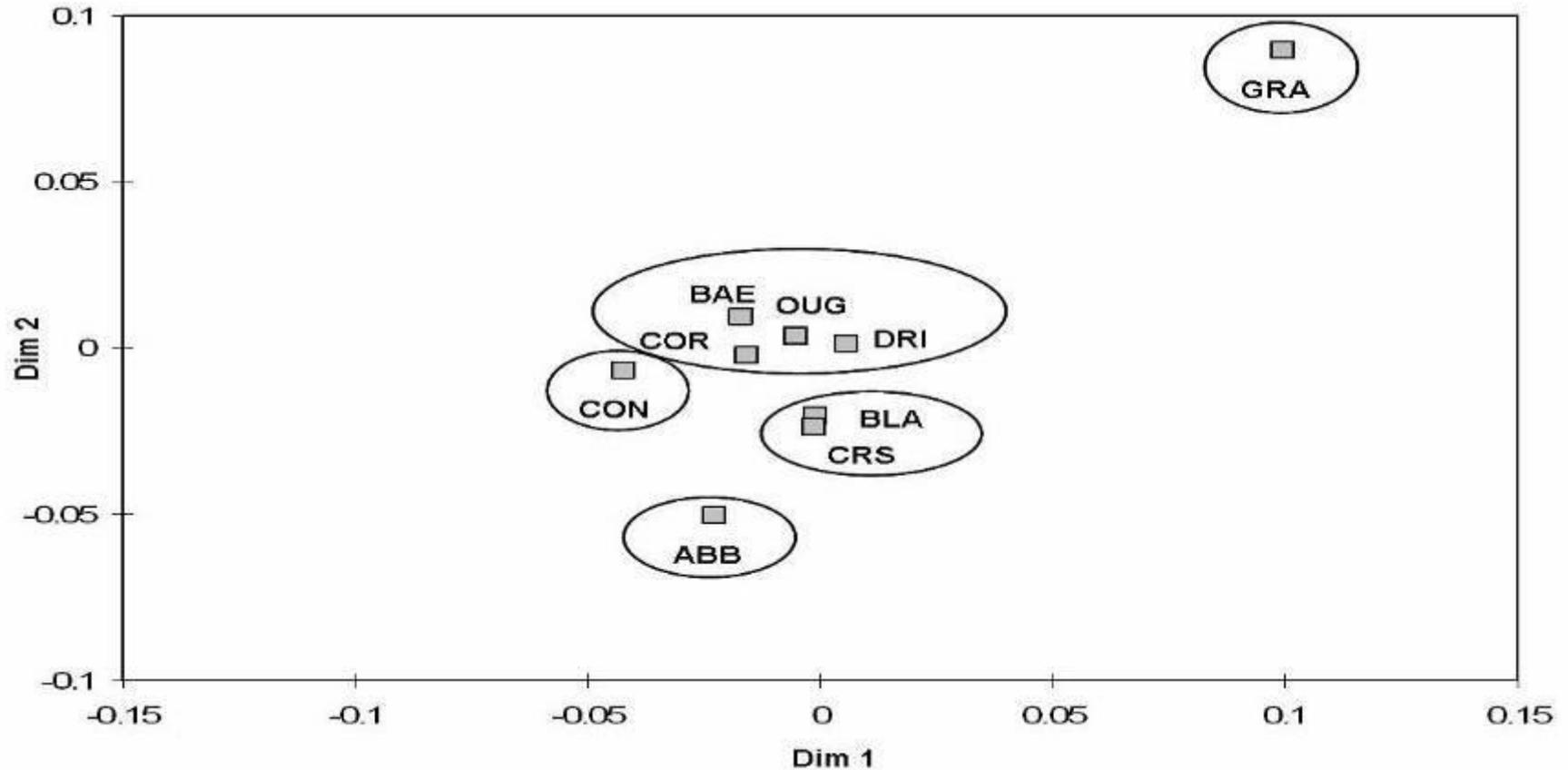
Recent Genetic Studies of Trout Stocks in L. Corrib

A sample of 50 juvenile trout were fin clipped and analysed genetically, at DNA level, from each of 9 sub catchments in the Corrib Lake Catchment.



Lough Corrib's surface area = 18,857Ha.

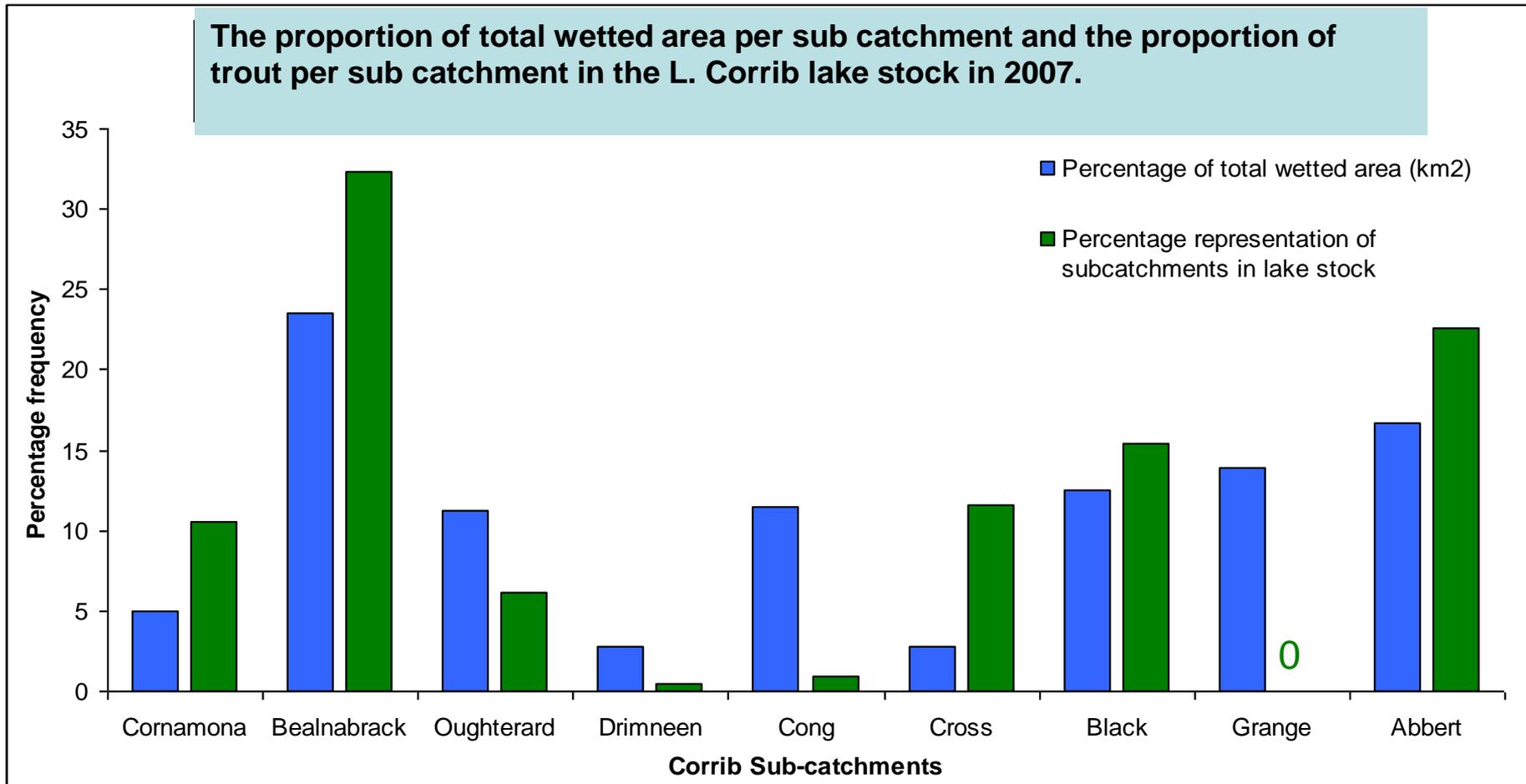
A Cluster Analysis of the Identifiable Trout Genetic Groups



- Western tribes are similar to one another genetically.
- Cong River fish are quite different.
- Two rivers on the eastern side (Cross and Black) are virtually identical genetically.
- Abbert and Grange trout, although close geographically, are very different genetically both to one another and all other groups.

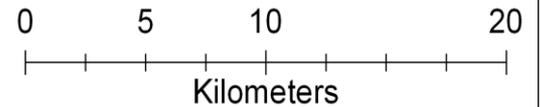
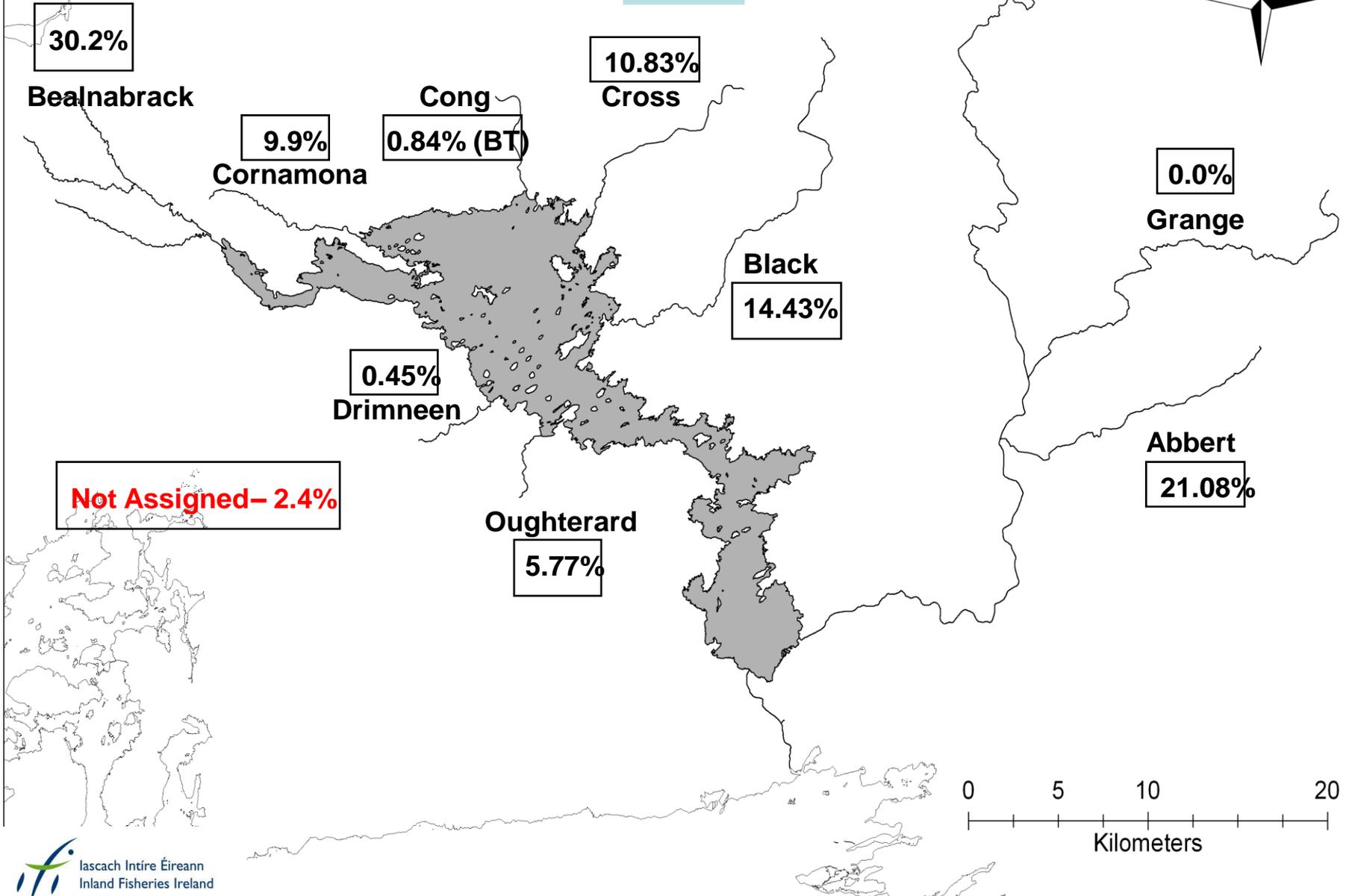
The Contribution of trout from individual sub catchments to L. Corrib's adult stock in 2007 relative to the size of their wetted area.

The proportion of total wetted area per sub catchment and the proportion of trout per sub catchment in the L. Corrib lake stock in 2007.



Contribution of sub catchments to lake stock (Hwler Methodology)

in 2007.



Genetic Integrity of Stocks and Issues of Gene Flow

• The strongest gene flow is

a) – from the Cornamona R. to the Baelnabreck and Oughterard Rivers.

This reflects the habitat degradation caused by sheep overgrazing particularly in the Baelnabreck.

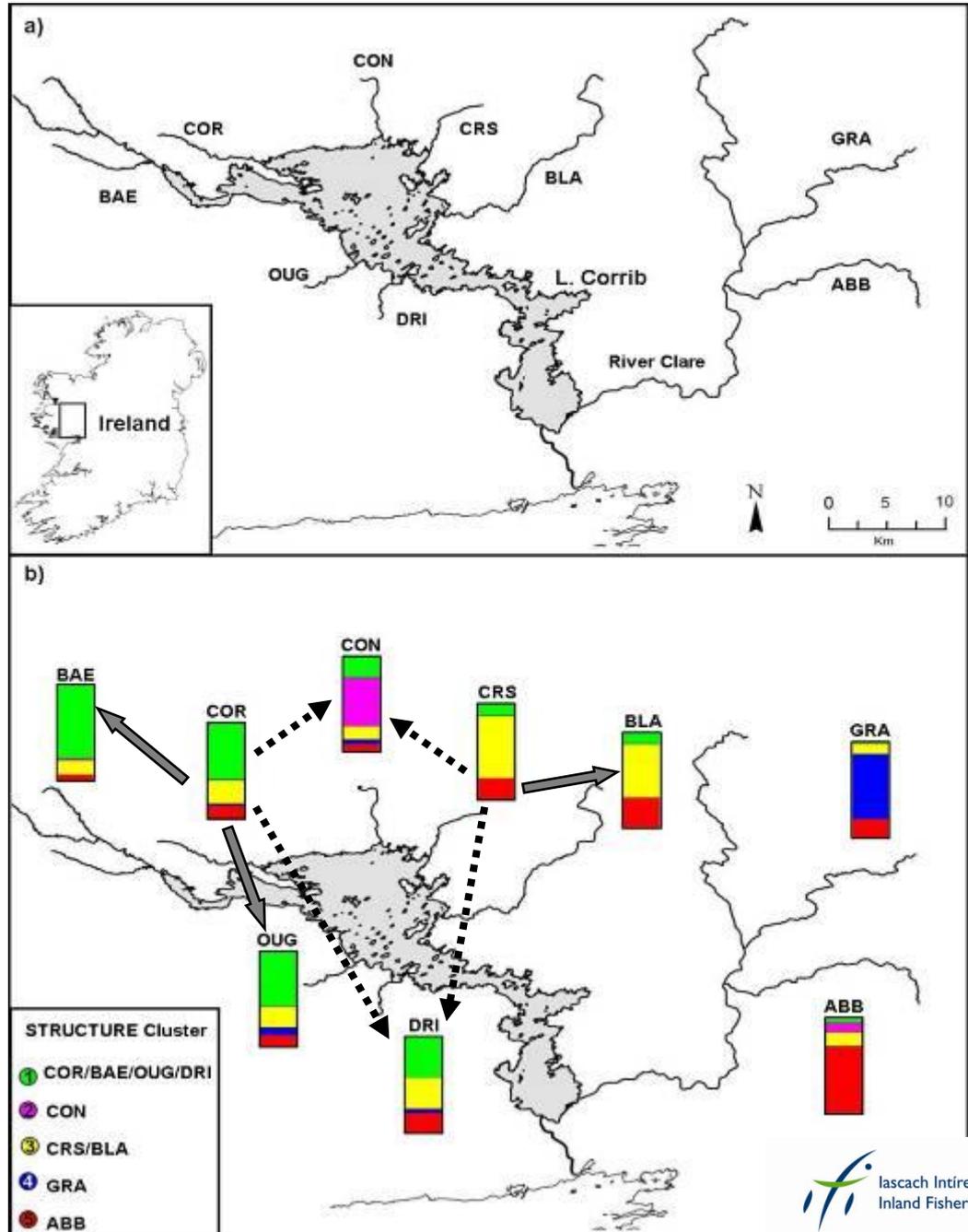
b) – from the Cross R. to the Black R. This suggests that drainage had a more severe impact on trout production in the latter channel.

There is an important inference here in relation to the Oughterard Hatchery;

- fish stocked from the hatchery into other sub catchments are not having any significant impact on native populations. This means that;

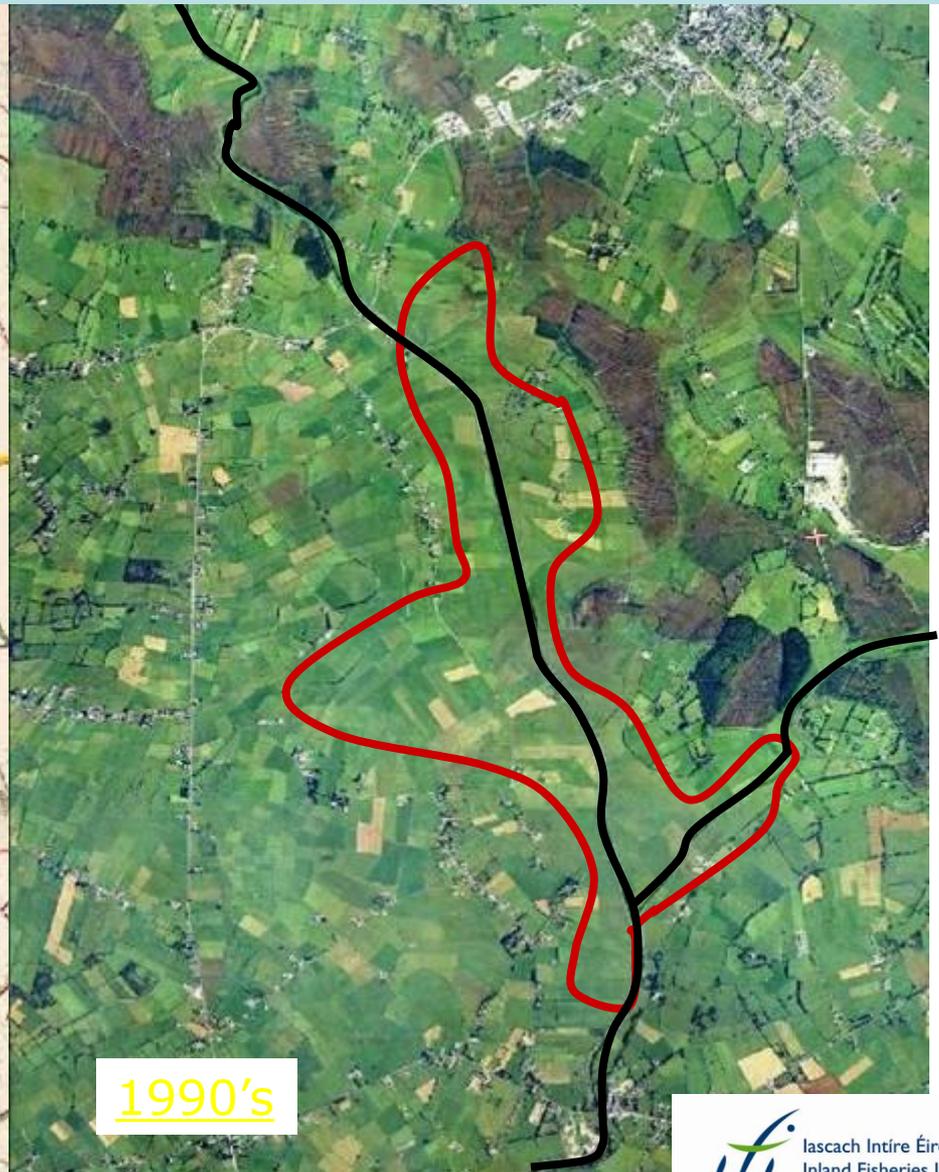
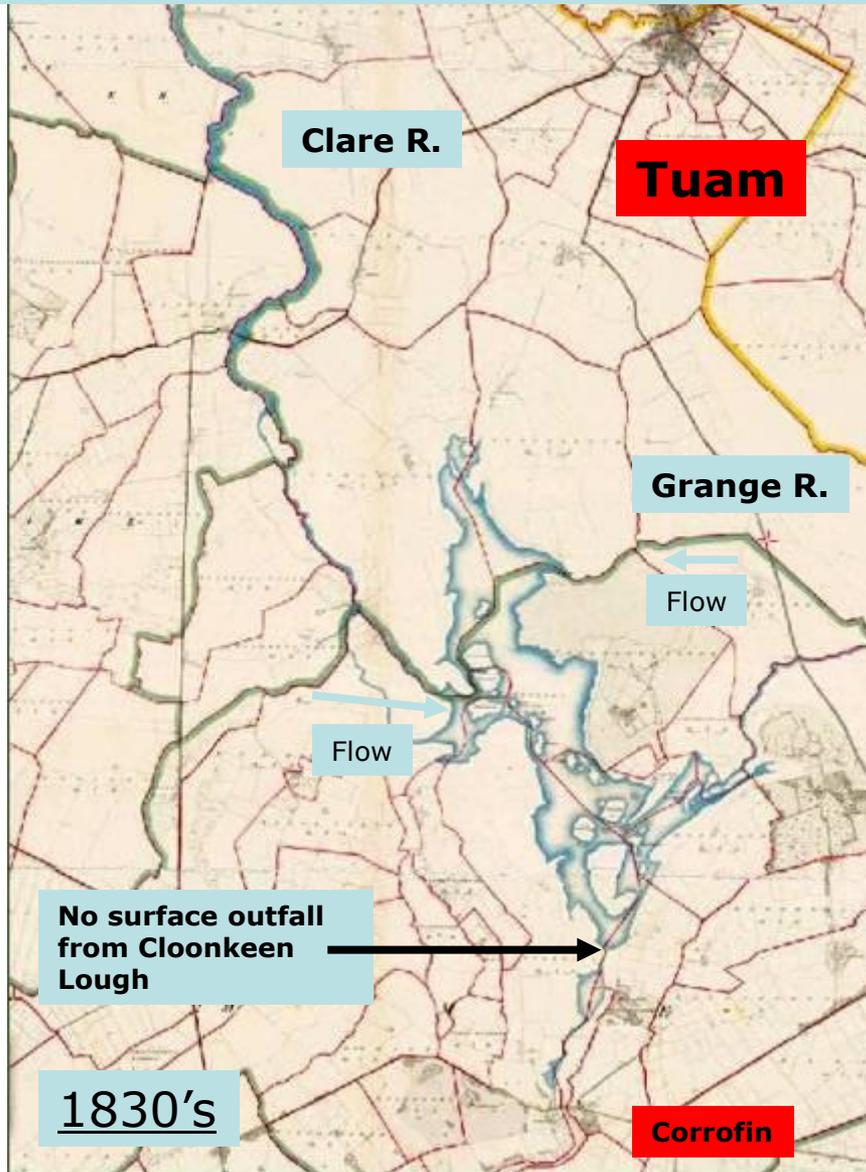
a) at best they are not surviving in significant numbers.

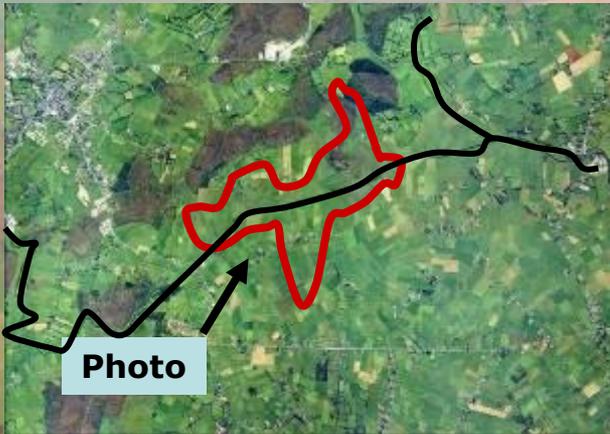
b) at worst they are reducing the contribution of wild fish from the Oughterard R. to the lake stock.



Why are the Abbert and Grange Stocks so different??

Some of the river reaches are completely artificial man made channels.

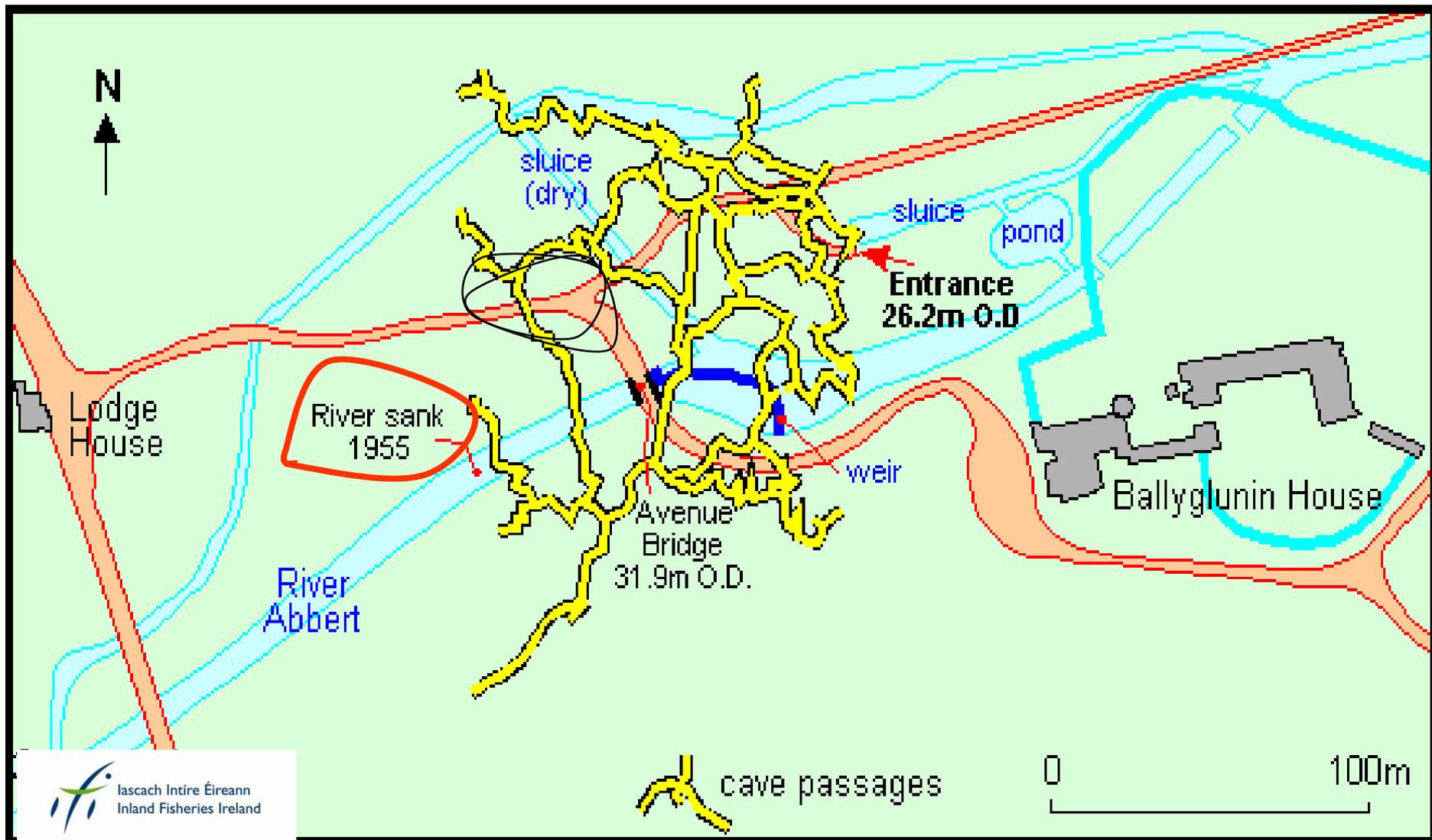




Photo

Nov. 20th, 2009 – Cloonkeen Lough is back again!!!!

In genetic terms why is the Abbert stock so different to the Grange ?



A Summary of the Findings for the Corrib Study

- **Most trout home to their natal stream to spawn.**
- **The Abbert, Cong(ferox) and Grange fish are very different to the other groups.**
- **The Grange R. trout population make no contribution to the lake stock.**
- **There appears to be a high level of "gene flow" from the Cornamona to both the Baelnabrack and Oughterard and from the Cross to the Black. This suggests that the release of fish from the Oughterard Hatchery is not making a significant contribution to stocks.**
- **The Grange genotype suggests that they have been an isolated population for a very long time. They are very important in conservation terms, even more so than the ferox.**
- **In contrast the Abbert stock, genetically, looks like a "recent amalgam" of all of the other fish stocks in the catchment. This may be because the river dried out on several occasions since the 1840's leading to the extinction of the original population.**

FEROX TROUT in Corrib and Mask – A Summary of the Genetic Findings

- Corrib and Mask ferox trout are identically in genetic terms.
- The only channel used by Ferox for spawning in the Corrib and Mask Catchments is the Cong Canal.
- There are no Ferox populations spawning in any of the inflowing rivers to L. Mask. This suggests that the construction of the Cong Canal in the 1840's allowed Corrib ferox fish to colonise L. Mask.



- The juvenile trout sample from the Canal d/s of Mask were all ferox trout. In contrast the juvenile trout sample from the Cong River d/s of Cong were a mix of Ferox and "ordinary" brown trout.
- Virtually all of the trout radio tagged in Mask in 2008 and 2009 were "pure ferox". Tracking of these fish confirms the genetic analysis – they are spawning in the canal and Cong River.

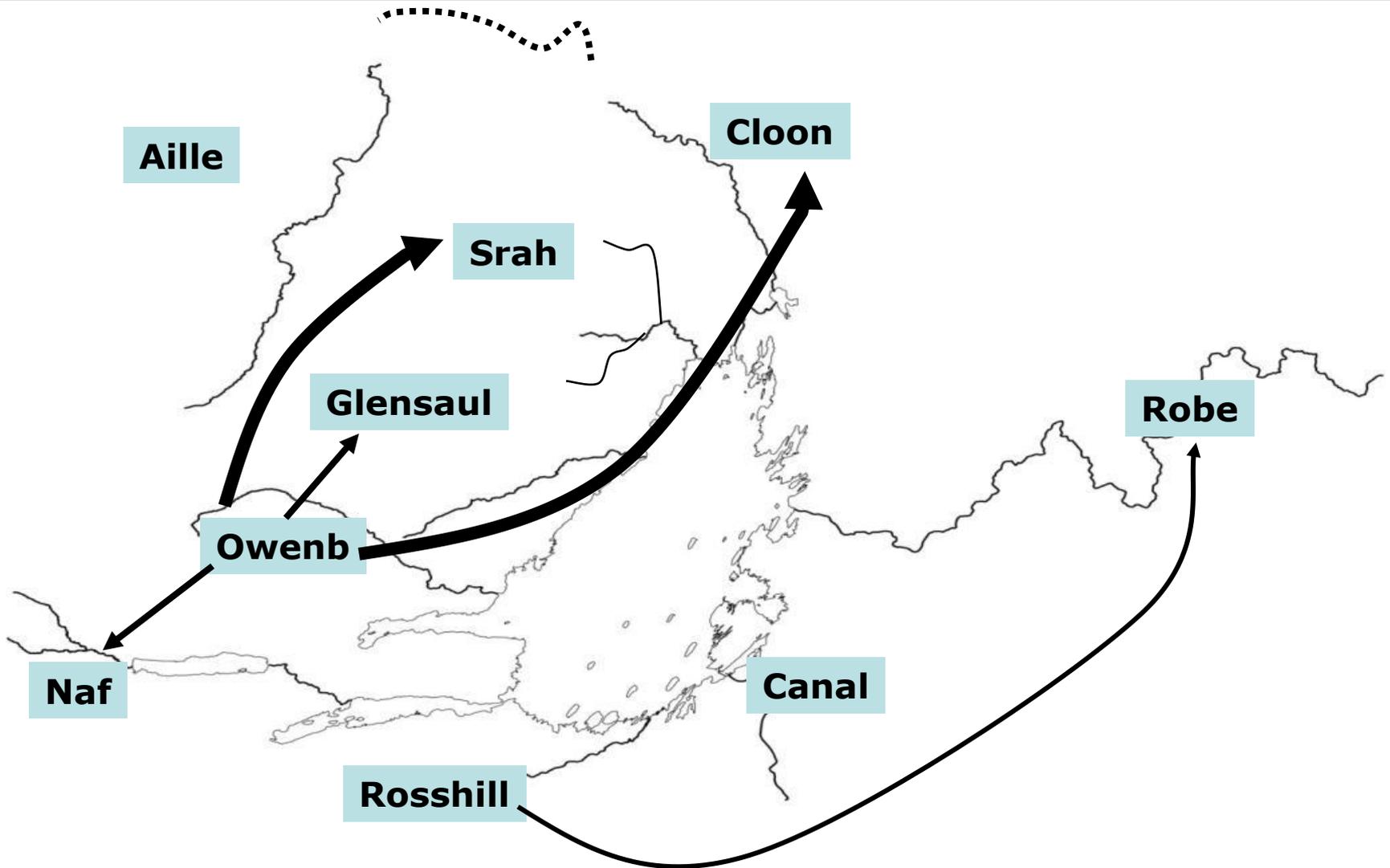
Mind the Ferox trout population in Corrib and Mask

The genetic study indicates that there is a small spawning population of ferox trout in the Corrib/Mask System – as little as a few hundred pairs of fish. In addition these are very long lived animals (≤ 15 years) which means that heavy cropping could very quickly deplete the stock.



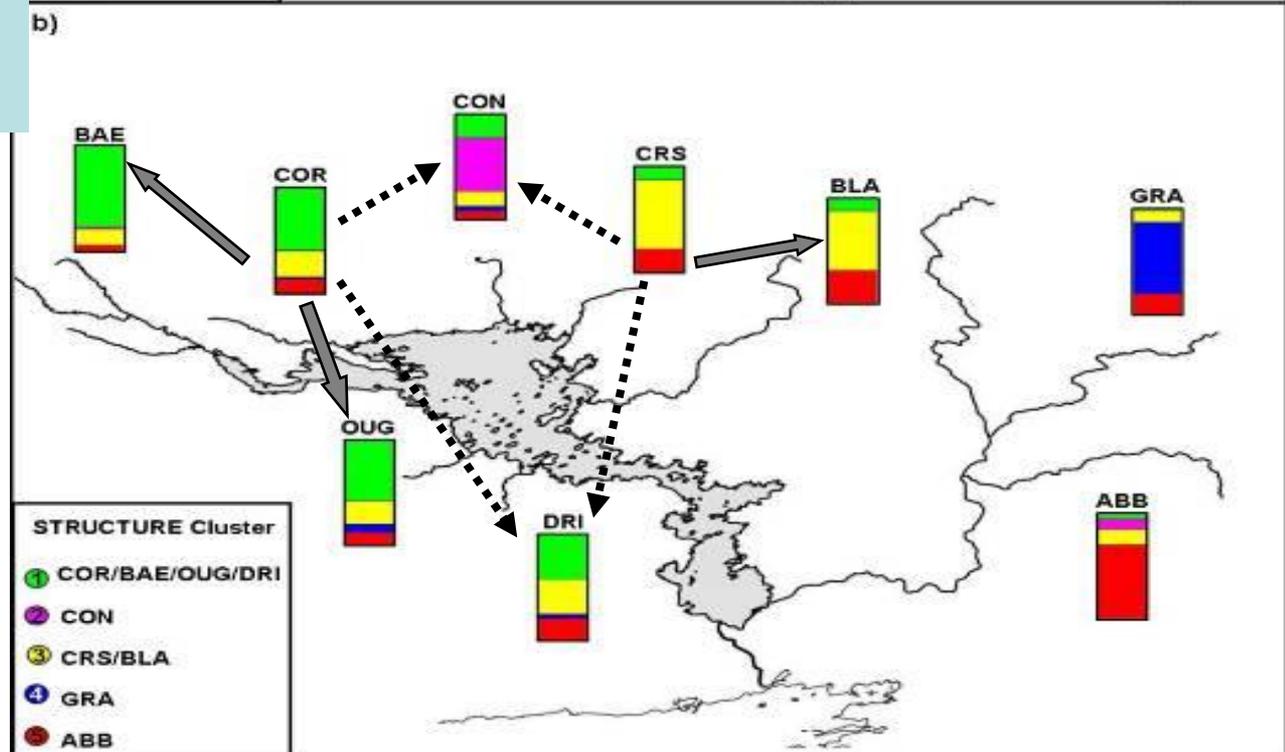
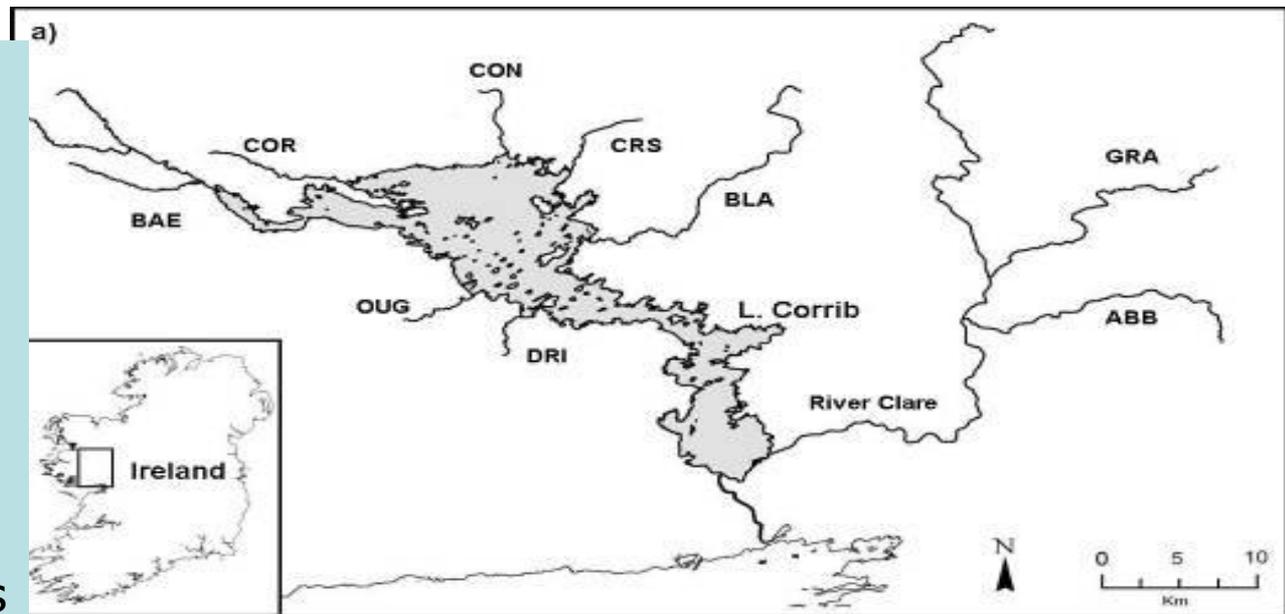
A Natural Rebalancing of stocks

Gene flow is nature's answer to a hatchery

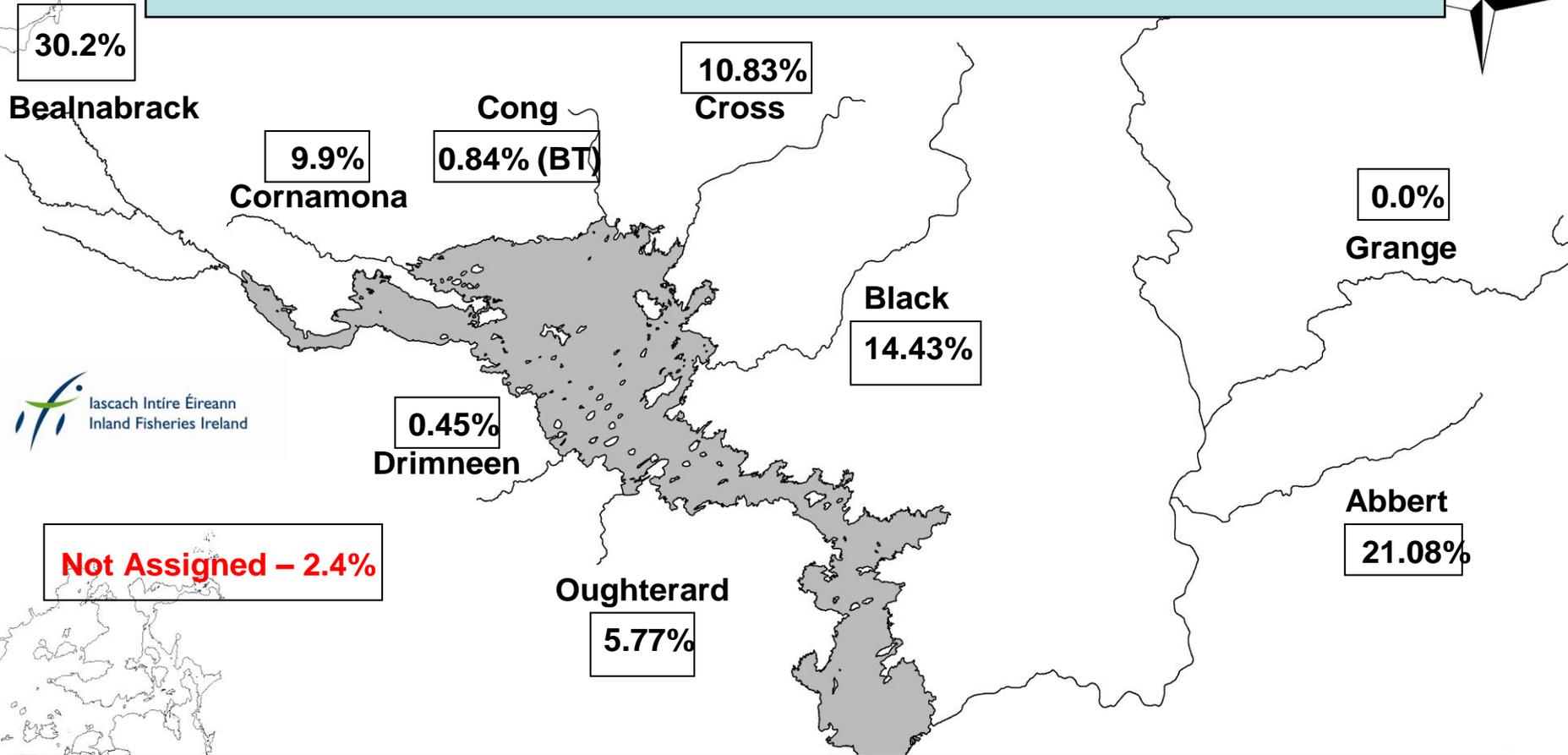


The same trend is evident on Corrib with fish moving from the stronger to the weaker stocks.

There is no evidence to indicate that the Oughterard hatchery is benefiting stocks in L. Corrib.



Use of available Resources



The Corrib and Mask Federations should consider spending available resources on;-

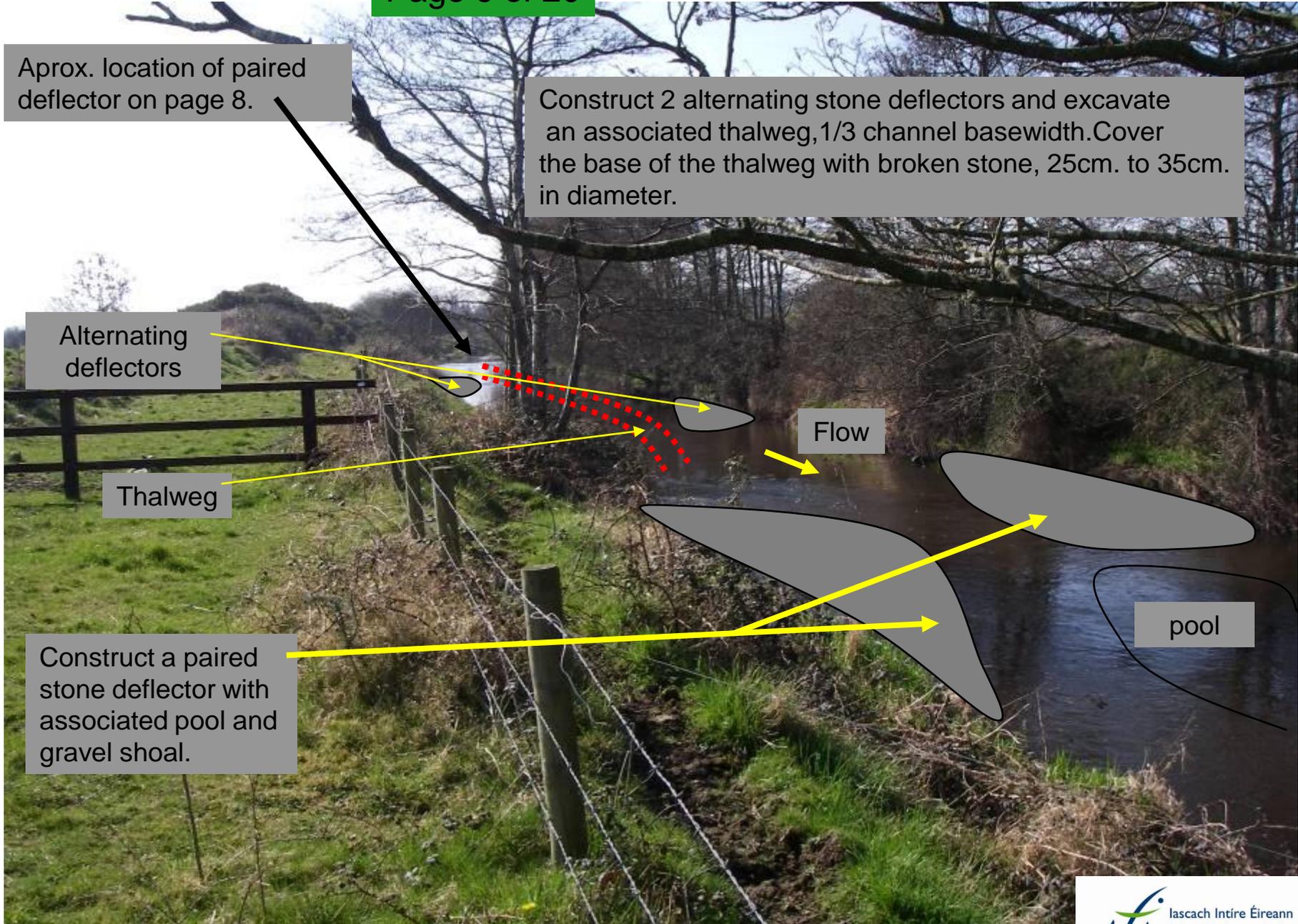
- enhancing channels on the western side of both lakes.
- The Corrib Federation should give serious consideration to closing the Oughterard hatchery.

The E.R.E.P Programme - Enhancing Drained Rivers

We need to introduce materials (rock and gravel) and use hydraulic machines to mimic the natural form of the river
without
reducing the drainage capacity of the channel



This is a positive response by the Drainage Authority to the requirements of the Water Framework Directive.



Aprox. location of paired deflector on page 8.

Construct 2 alternating stone deflectors and excavate an associated thalweg, 1/3 channel basewidth. Cover the base of the thalweg with broken stone, 25cm. to 35cm. in diameter.

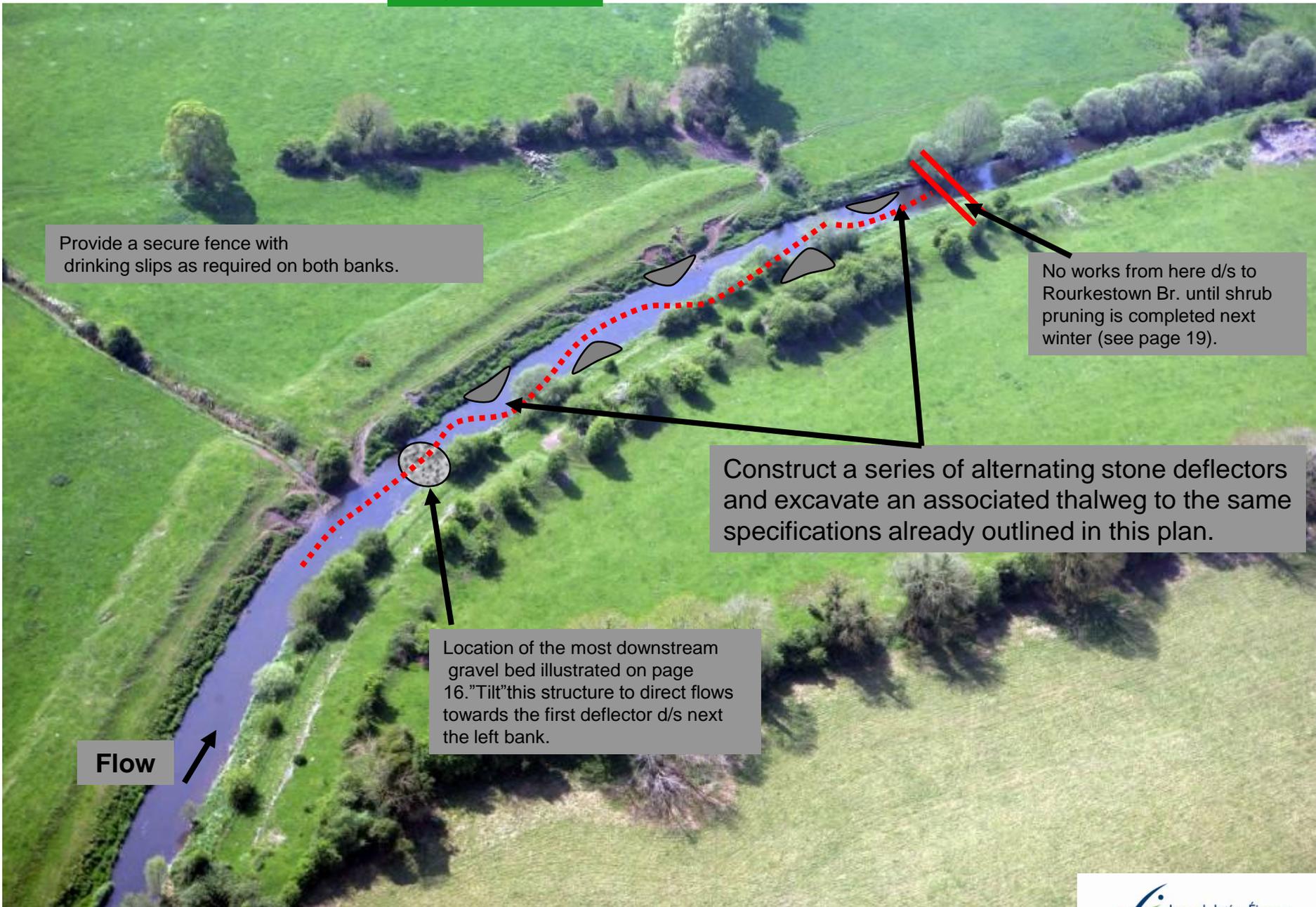
Alternating deflectors

Thalweg

Flow

pool

Construct a paired stone deflector with associated pool and gravel shoal.



Provide a secure fence with drinking slips as required on both banks.

No works from here d/s to Rourkestown Br. until shrub pruning is completed next winter (see page 19).

Construct a series of alternating stone deflectors and excavate an associated thalweg to the same specifications already outlined in this plan.

Location of the most downstream gravel bed illustrated on page 16. "Tilt" this structure to direct flows towards the first deflector d/s next the left bank.

Flow

Trout Genetic Studies of drained river systems.

This management tool will help us to target our programmes more effectively.

