

Using Genetic Tools to Manage Scottish Salmonid Fish Populations



Lessons from Recent studies & Implications for
Management

The big leap forward

Loch Feochan Study

Implications for management;

- Genetic Audits
- Associated Life history
- Exploitation
- Habitat & Water
Resource Management
- Restoration & Farm
escapes

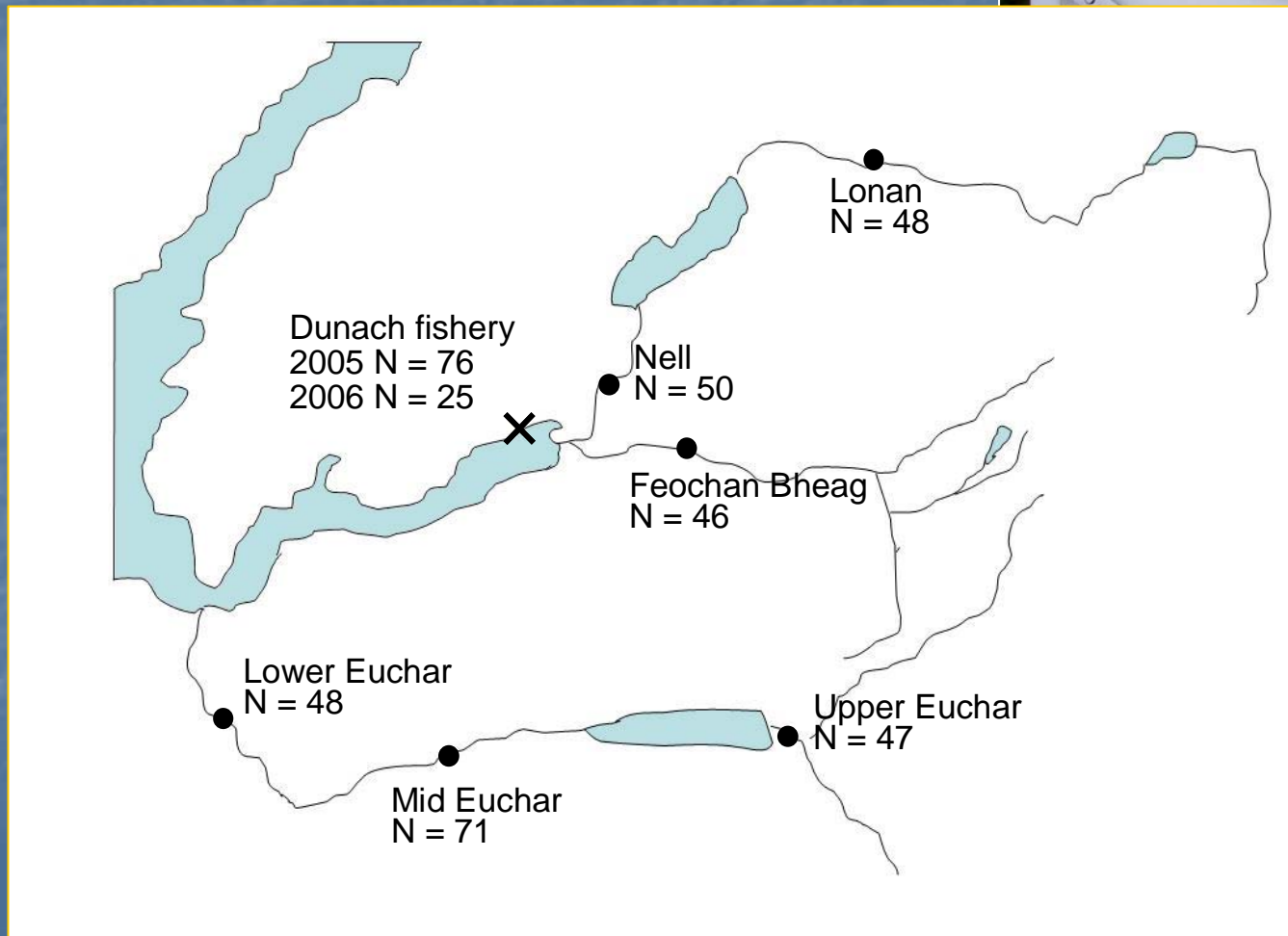
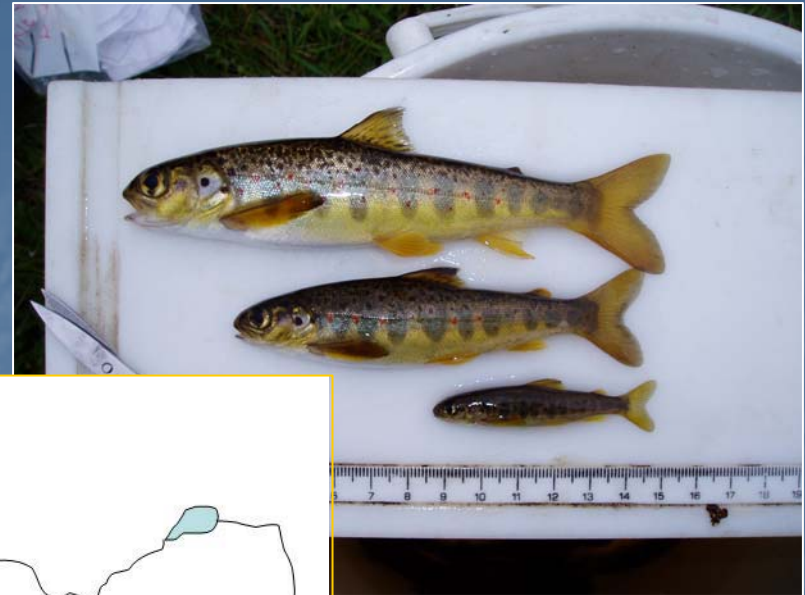


Feochan Study

- Determine stock composition of net fishery
 - Investigate sustainability of the fishery
 - Investigate stock structures in Nell & Euchar Rivers
 - Investigate stock abundance?
 - Provide insight into potential of genetic basis for management
 - Provide Management Advice to local fisheries
- Investigate potential for farm fish interbreeding
- Project partners; AFT, FRS & AST

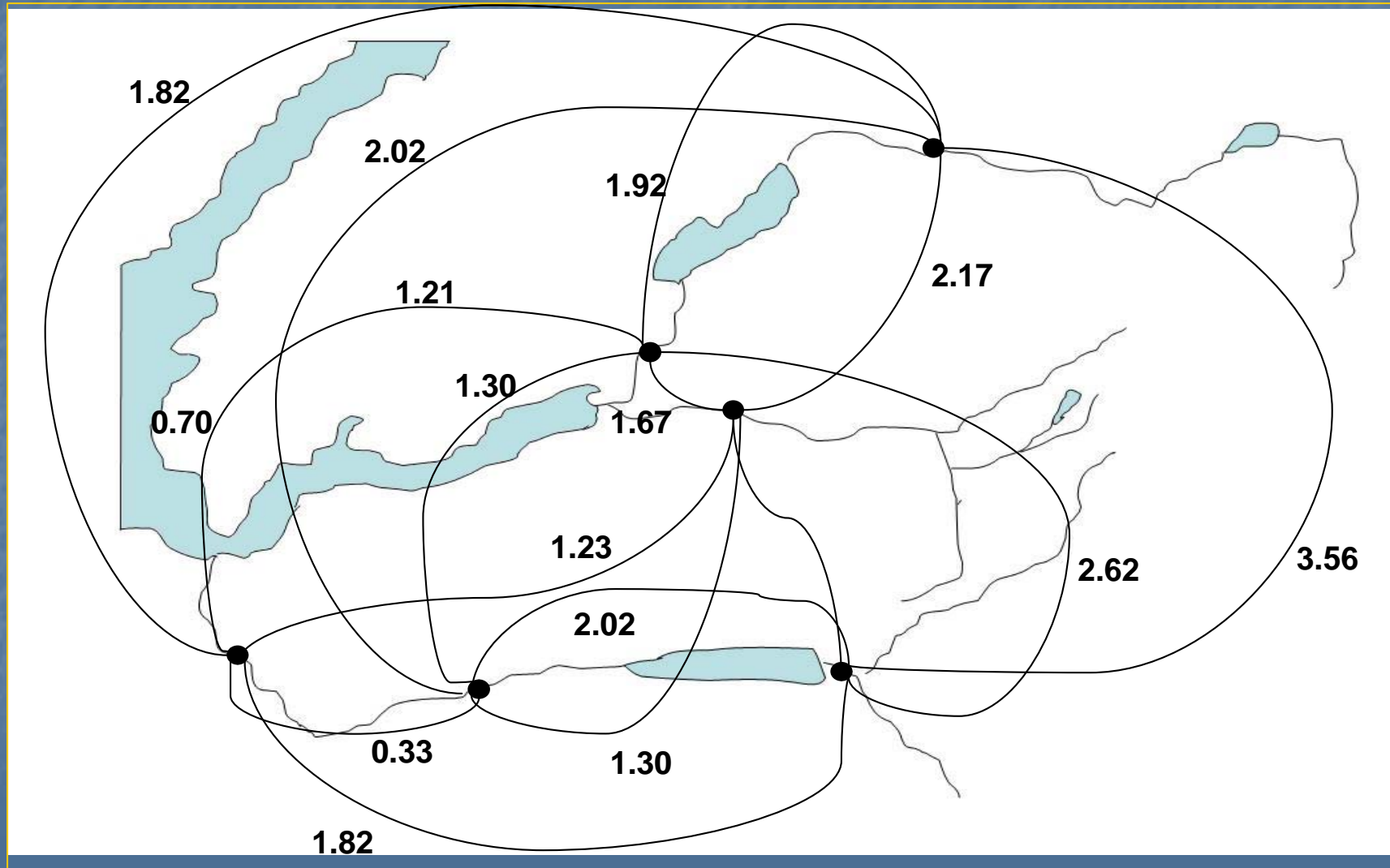


Sampling – 2005-06.....



- **AFT** – electrofishing and net sampling
- **FRS** – Genetic analysis & interpretation
- **AST** - funding

Genetic distance measures of absolute levels of differentiation.



General Findings

1. **Genetic structuring of juveniles** - Significant differences between & within catchments
2. **Mechanism** - Topographical features; Lochs, waterfalls & tributaries
3. **Fishery Exploitation** – Fishery is exploiting ALL parts of both catchments, upstream sites may be more vulnerable.
4. **Net catch exploitation** – Both Rivers, catch of 100 fish represents 17 to 30% of breeding individuals.
5. **Effective population size** – estimates of 338-583 salmon in Loch Feochan systems.
6. **Detecting farmed escapes** – Lack of baseline data on farm populations

Implications for management

A New level of consciousness

Inform & focus;

- Management plans
- Exploitation
- Restoration initiatives
- Habitat management
- **Conserve diversity**
- Enhancement stocking
- Target resources



Genetic Audit

60-100 catchments with migratory salmonids in Argyll

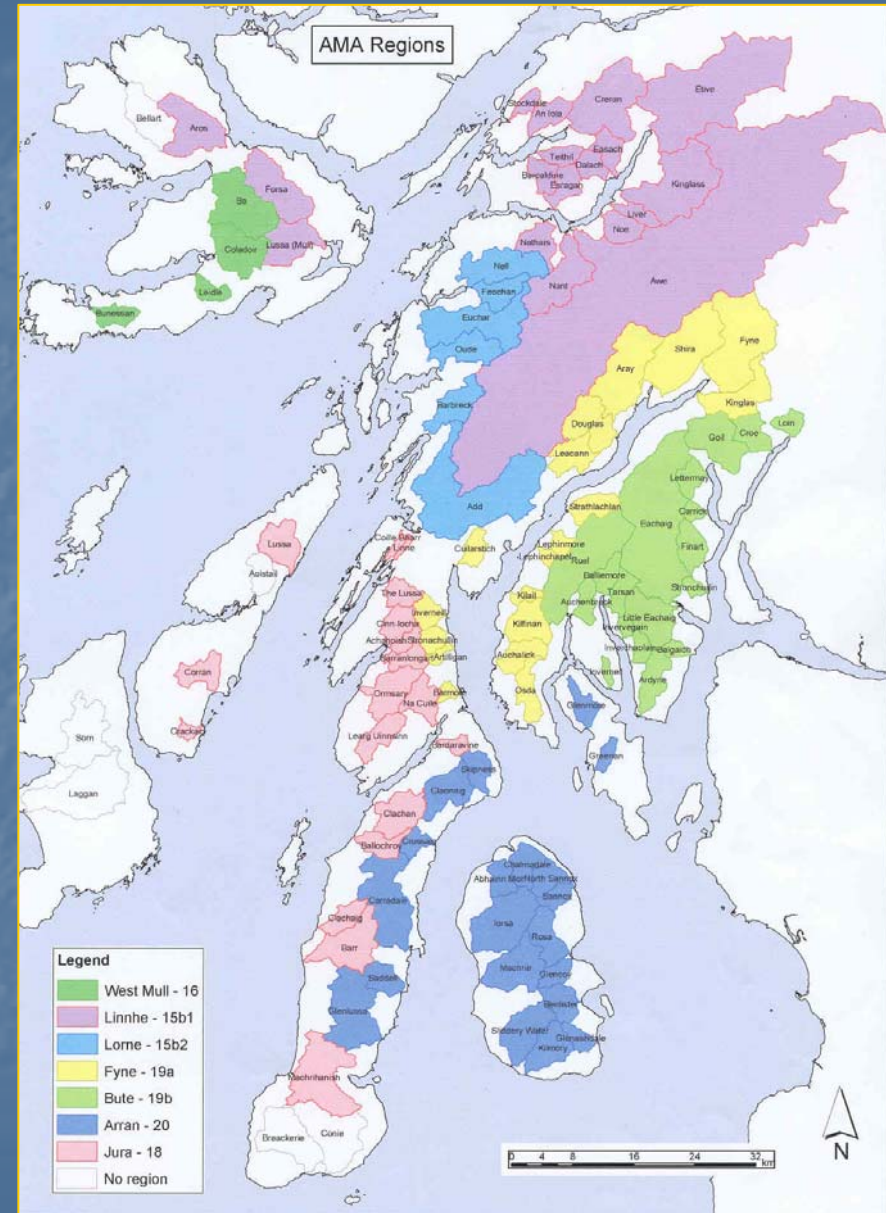
Prioritise on the basis of ?;

Potential diversity

Fishery value

Existing pressures

Available resources



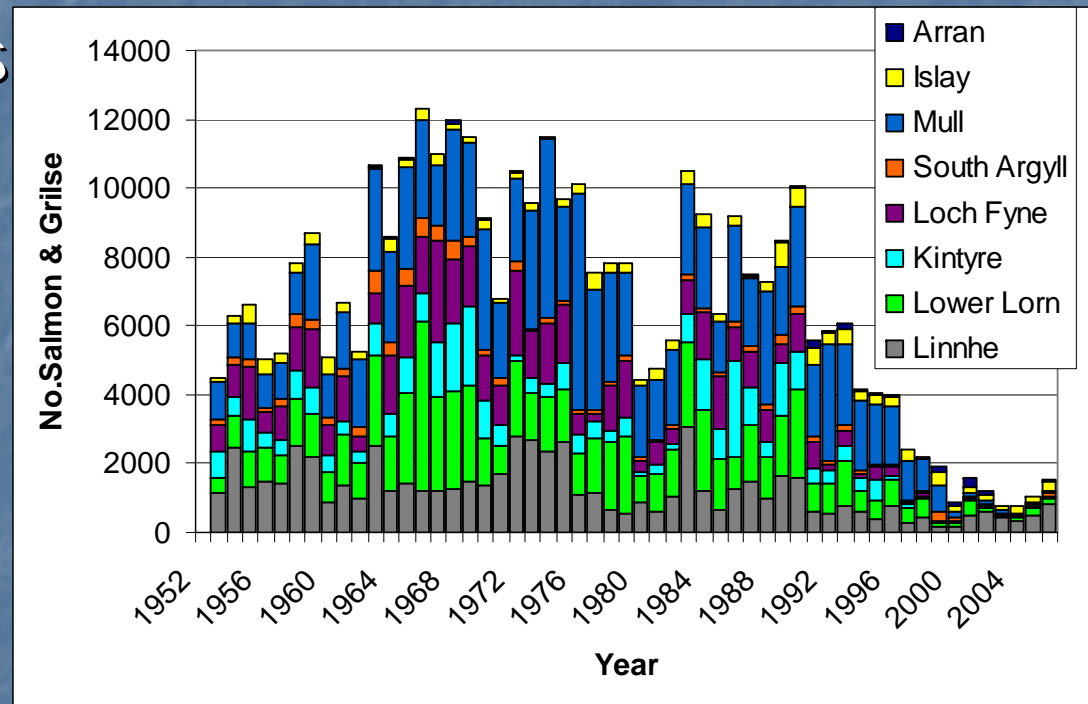
Associated life history

- Investigate characteristics of breeding groups;
- Age at smolt
 - Sea age
 - Adult return timing
 - Morphology
 - Environmental factors
 - Missing groups



Control of exploitation

- Identify strong & weak components
- Control exploitation in relation to run timing
- Set conservation limits
- Raise awareness amongst fishers



Focus Habitat management

Understand influence of catchment characteristics

- Degradation
- Reduction
- Fragmentation

Prevent decline

- water resources
- Land use

Better use of available resources



Restoration Activities



Inform hatchery intervention strategies;

- Broodfish selection
- Hatchery infrastructure
- Stocking locations
- Replicate wild scenario

Conservation focus;

- Support vulnerable populations
- Avoid inbreeding depression
- Re-introduce lost components

Farm escapes & stocking

Impacts largely unknown in Scottish context

- Ecological & genetic
- Reduction of performance
- Long term consequences?

Detecting influence

- Base-line information
- A political will to focus on this issue



Summary

- Demonstration of stock structuring & abundance
- Improve & Focus Management of fisheries & habitats
- Underpin management plans & activities
- Avoid further Loss of biodiversity & stock performance from;

over-exploitation

Habitat degradation

Inappropriate stocking

Interactions with farm fish