

The impact of salmon aquaculture on wild salmonids in Scotland: extent of the evidence

Hazards:

- Sea lice
- Introgression
- Other disease and parasites
- Other factors?

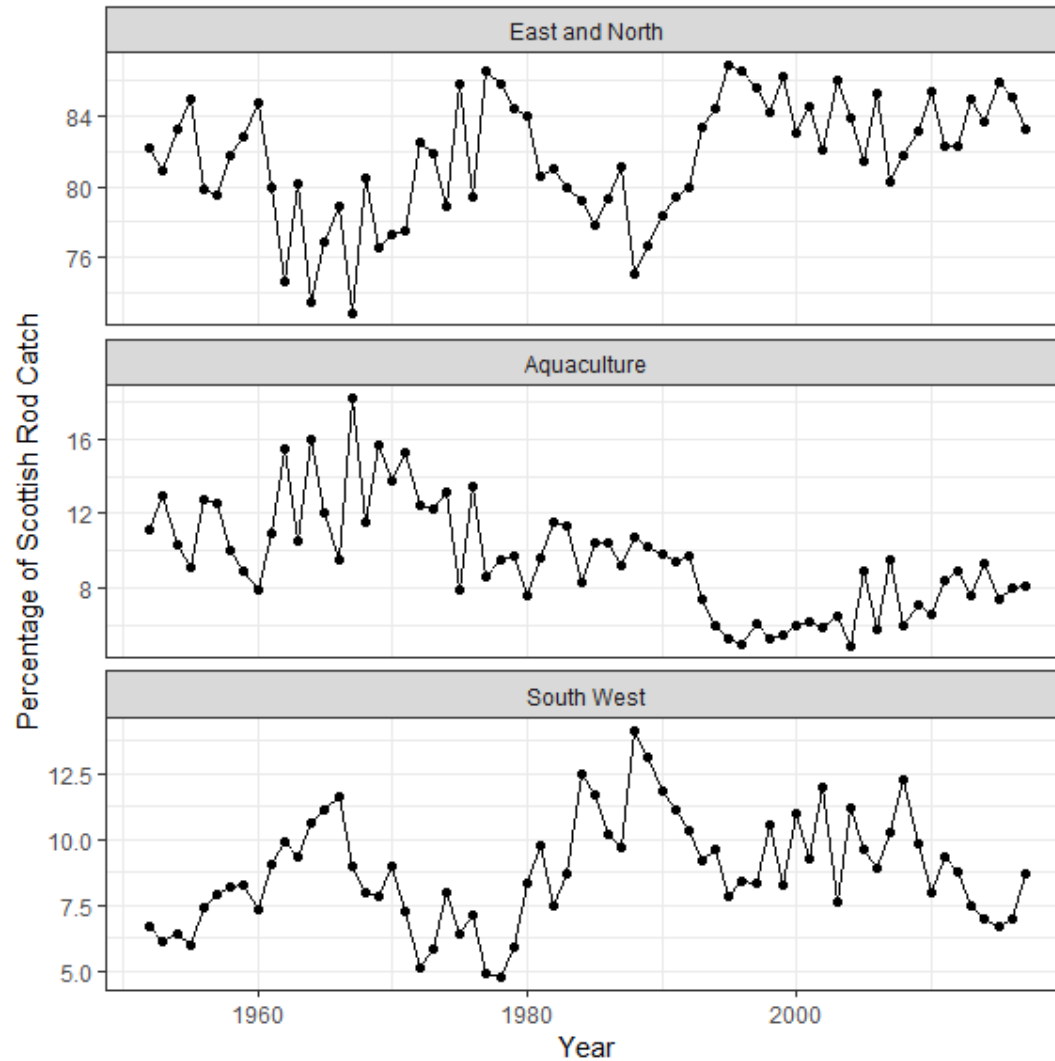
Overall trends

- Salmon rod catches have declined most steeply on the west coast relative to other areas during expansion of aquaculture.
- This is also the case for sea trout, but note earlier declines.

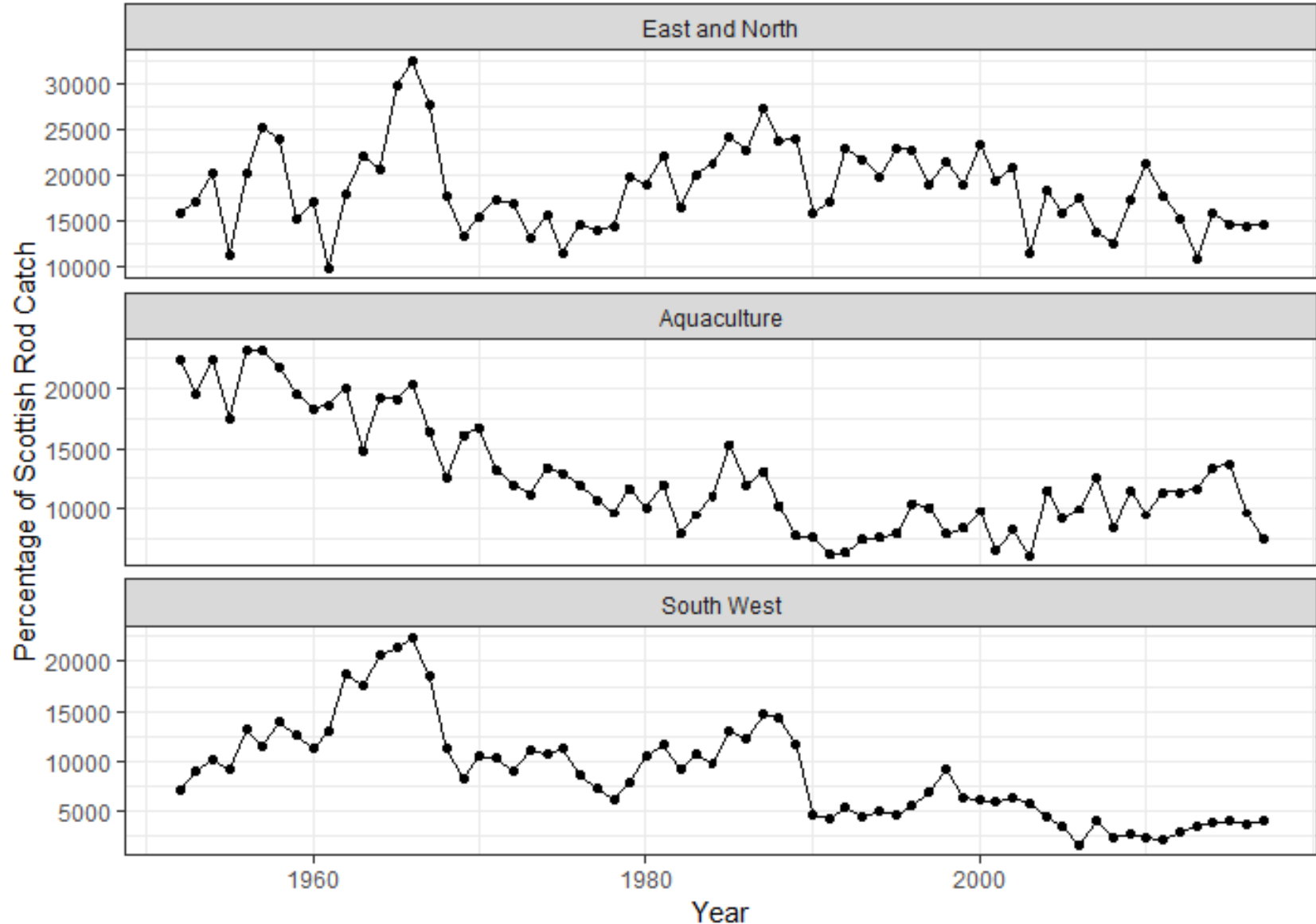
Overall status

- Salmon conservation status (based on adult data) is poor on much of the west coast
- Also there are low numbers of juvenile salmon in some systems

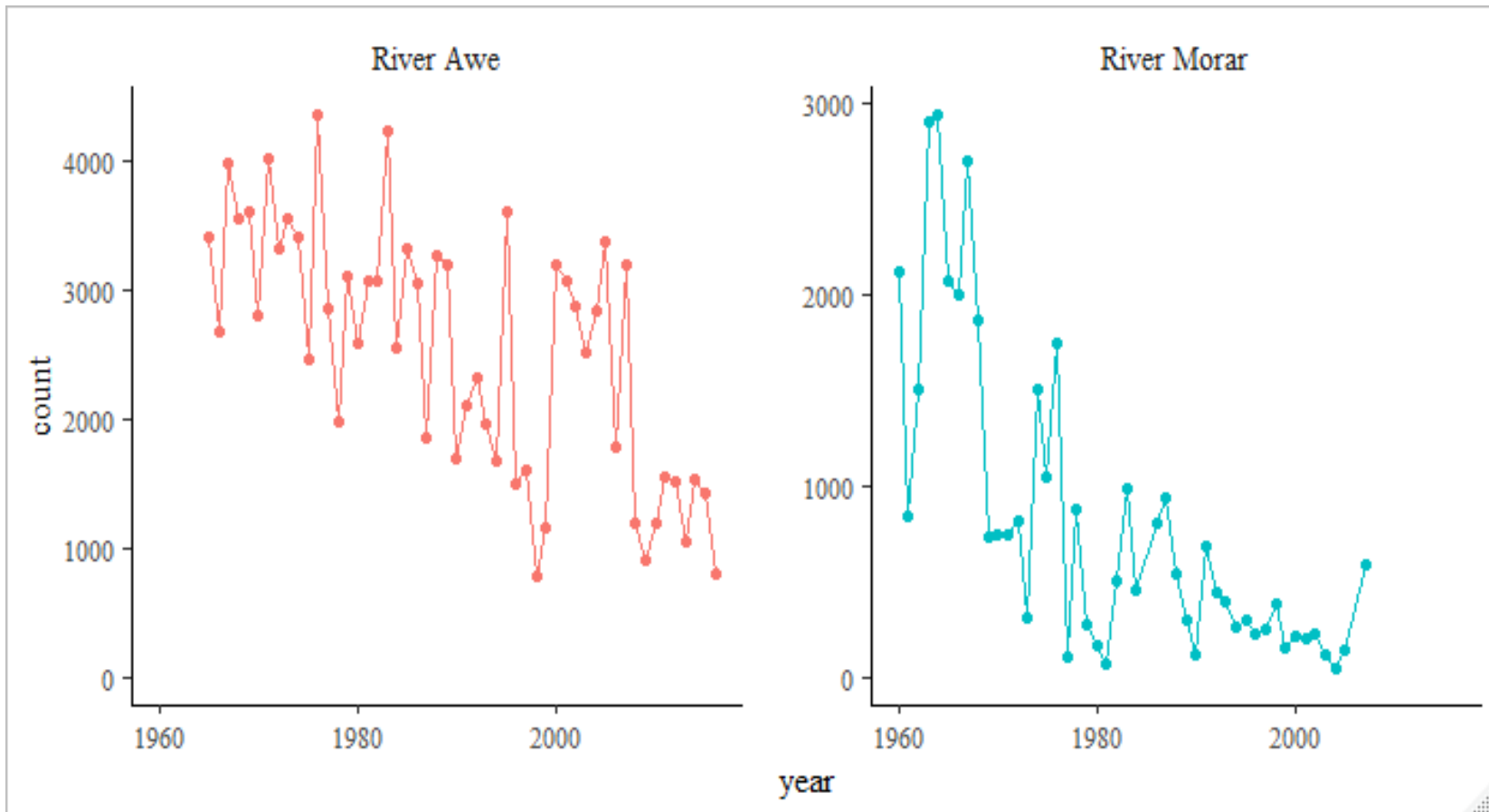
Relative change in salmon rod catches in the “aquaculture zone”- Hope to Eachaig



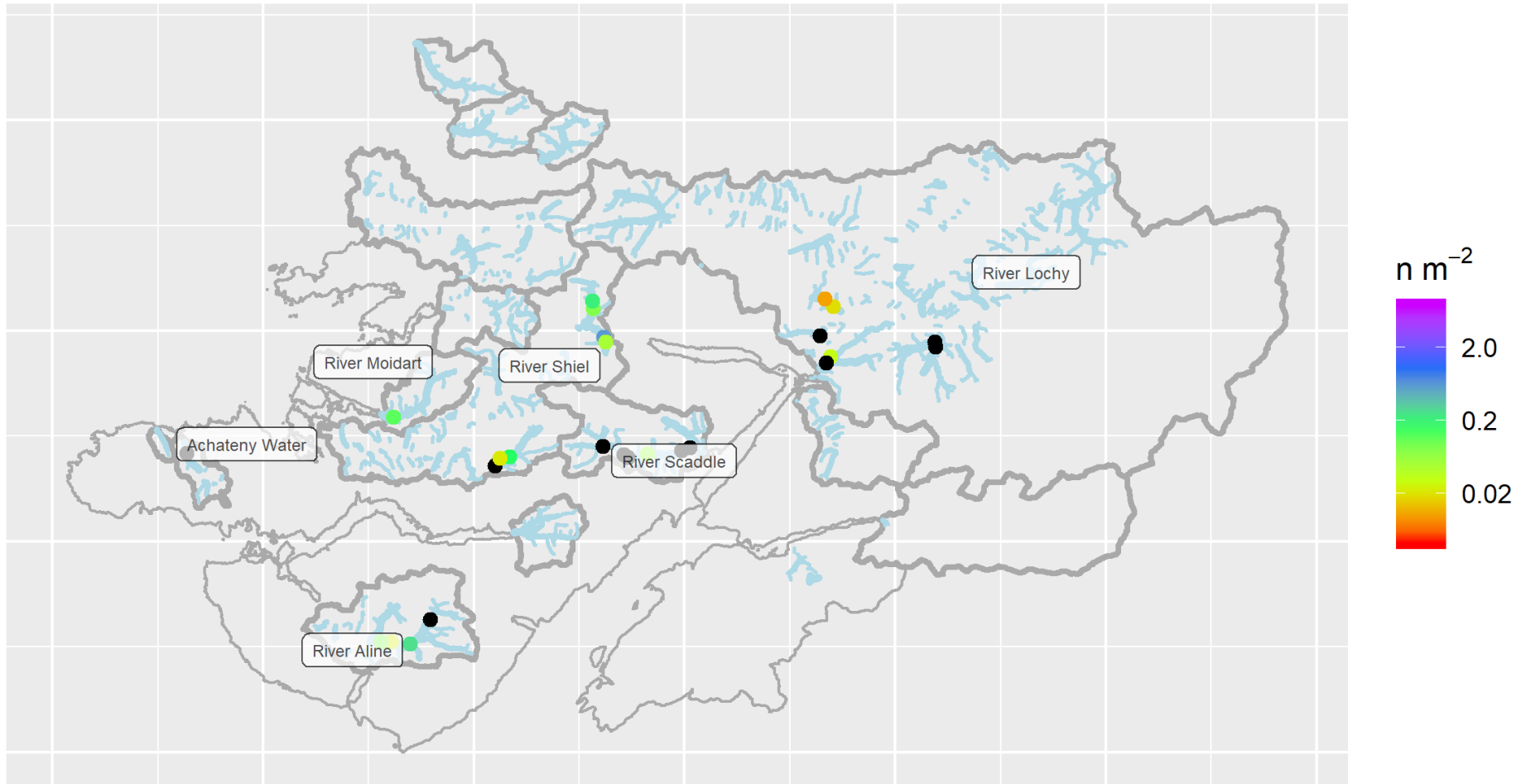
Sea trout



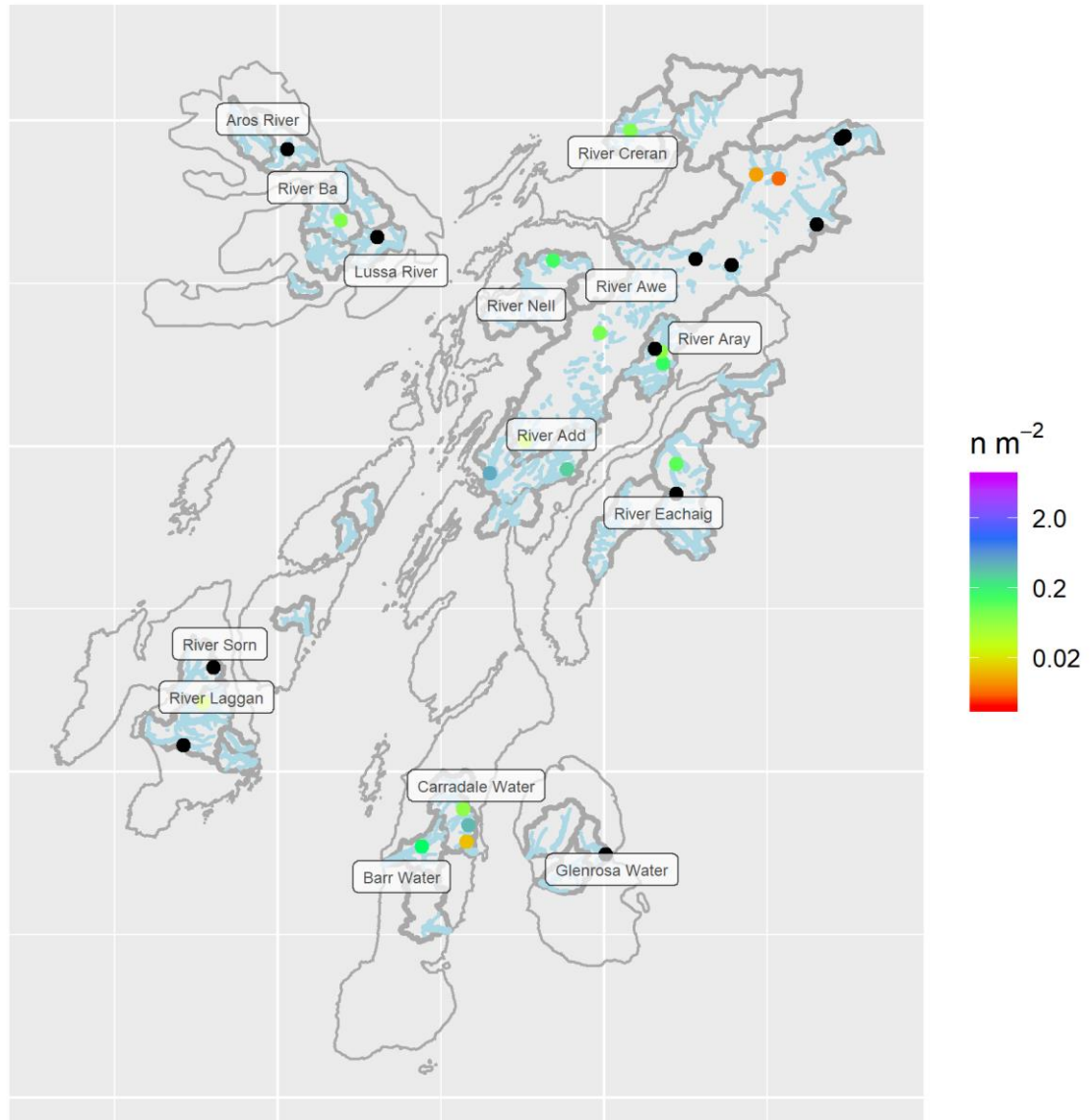
West Coast salmon counters



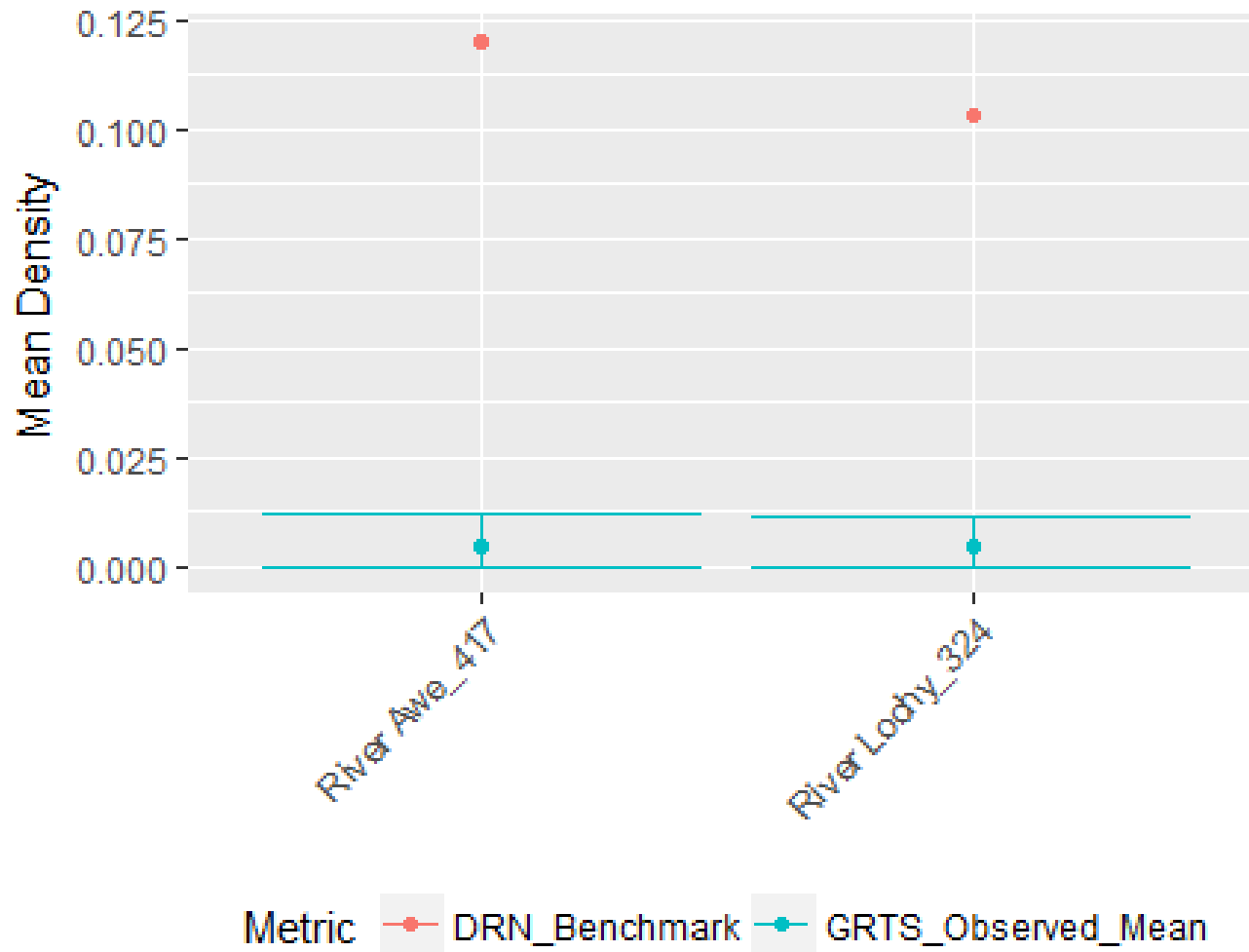
Fry - Observed densities



Fry - Observed densities



Juvenile salmon densities, 2018



Implications?

- Correlative data
- Suggests that there are particular problems for wild Atlantic salmon on the West Coast against a general wider decline.

Impacts of salmon aquaculture on wild salmonids

Hazards:

- Sea lice
- Introgression
- Other disease and parasites
- Other factors?

Summary of background research

- Presence of farmed salmon increases sea lice in the environment
- Infestation of lice on sea trout tends to be higher nearer farms and in second years of production
- However, complex relationships with distance can be expected due to hydrodynamics and movements of fish
- There is no evidence of the level of impact on either salmon or sea trout populations in Scotland

Experimental approach

- Chemically protecting salmon smolts from lice infestation suggests an impact from parasites of 0-40% of returning adult fish in Norway/Ireland

SARF project

Development of a network for determining spatial and temporal variation in marine survival of Atlantic salmon and effects of anti-sea lice agents

2015-2018

Overall objective:

Assess impacts of sea lice in seeking the sustainable development of salmon aquaculture in Scotland

Project objective:

Commence a network of sites to test effects of anti-lice agents on Atlantic salmon survival in the wild

Experimental approach similar to that taken previously in Ireland and Norway

Results obtained elsewhere are not necessarily transferable to Scottish conditions.

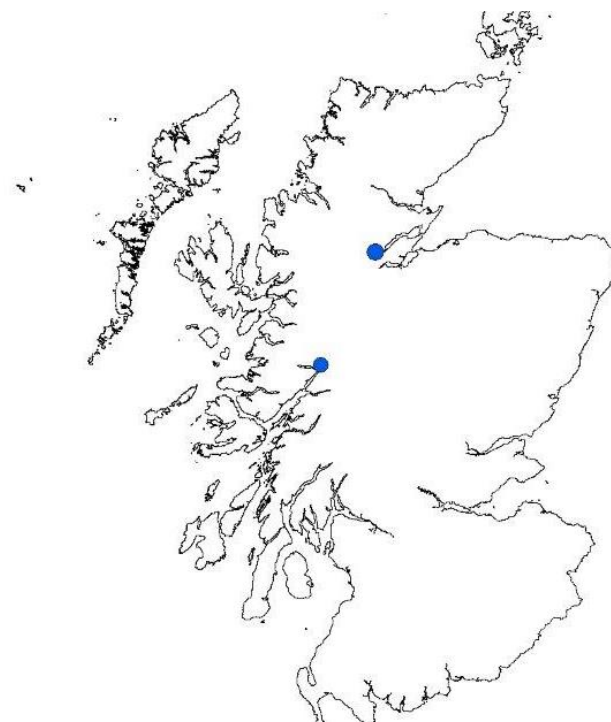


SARF project

- Capture 1000-2000 salmon smolts on downward migration
- PIT tag fish (FDX)
- One group has an anti-lice treatment
- One group untreated
- Both released back to river
- Record numbers and condition of returning salmon in treated and untreated groups

- West coast site: Lochy system, Loy and Lundy burns
- East coast site: River Conon

- Treatments conducted 2015, 2016.
- Returners captured 2016, 2017, 2018



SARF project

Recapturing fish

Conon east coast site used a fixed fish trap.



Temporary traps were designed for the west coast sites.

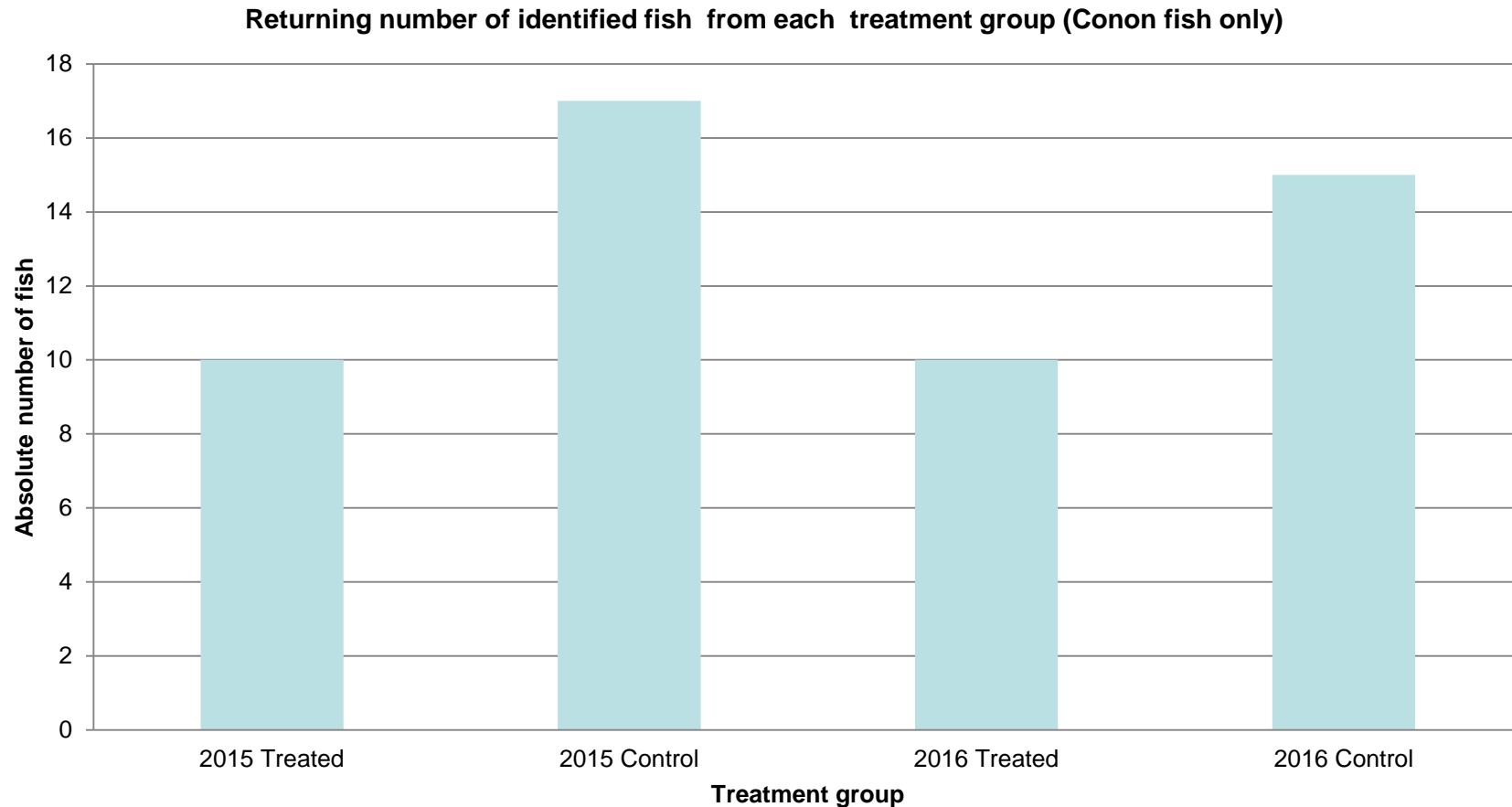


SARF project

- Modified design of fences with automatic PIT readers due to river conditions.
- Snorkel surveys and electrofishing also conducted.



Results from Conon



- Returning fish numbers on the west coast very low. Difficult to achieve required numbers using wild fish and temporary traps

River Awe

- Wild smolts captured in 2017; comparison of treated (n = 454) and control (460), all fish fitted with electronic tags
- Returning adults detected automatically as they passed through the Awe barrage at the lower end of the system
- Grilse return in 2018:
 - 5 in the control group (subject to sea lice attack)
 - 11 in the treatment group (protected from sea lice)

Impacts of salmon aquaculture on wild salmonids

Hazards:

- Sea lice
- Introgression: a survey is currently being conducted
- Other disease and parasites: no current evidence of serious impacts
- Other factors?

Overall position

- There is concern about the conservation status of wild salmon on the west coast of Scotland
- There are obvious hazards associated with salmon aquaculture
- There is little information on the level of impact of aquaculture in a Scottish context

Current developments

- Technical Working Group is aiming to develop a risk assessment framework – in parallel with Interactions Group.
- The purpose of the framework will be to enable regulators to determine the acceptability of proposed open net marine cage fish farms with respect to risks to wild fish.
- The framework would be adaptive, taking account of feedback from environmental monitoring and modelling.

Proposed regulatory roles

- The Group is considering the regulatory powers and competencies needed to operate the risk assessment framework.
- It will explore whether the existing regulatory powers and competencies of any of the regulators (local authorities, SEPA, Marine Scotland), individually or in combination, are sufficient and make recommendations accordingly.
- It will also set out how the different public bodies propose to coordinate their work.