

A simple compartmentalised management strategy for control of bacterial kidney disease in Scottish aquaculture



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Introduction

- Fish production in Scotland is mainly Atlantic salmon (*Salmo salar*) and rainbow trout (*Oncorhynchus mykiss*).
- Live fish movements are a known risk in the spread of disease between sites however such movements are integral to farmed fish production.
- Bacterial kidney disease (BKD), caused by *Renibacterium salmoninarum* impact is considered more serious on farmed salmon than on farmed trout.
- *Renibacterium salmoninarum* is endemic on some Scottish trout farms so it is desirable to minimise exposure of farmed salmon by controlling the movements of farmed trout.
- An analysis was carried out to assess how connected the salmon and trout industries in Scotland are and whether it is possible to compartmentalise the two industries for disease control purposes.

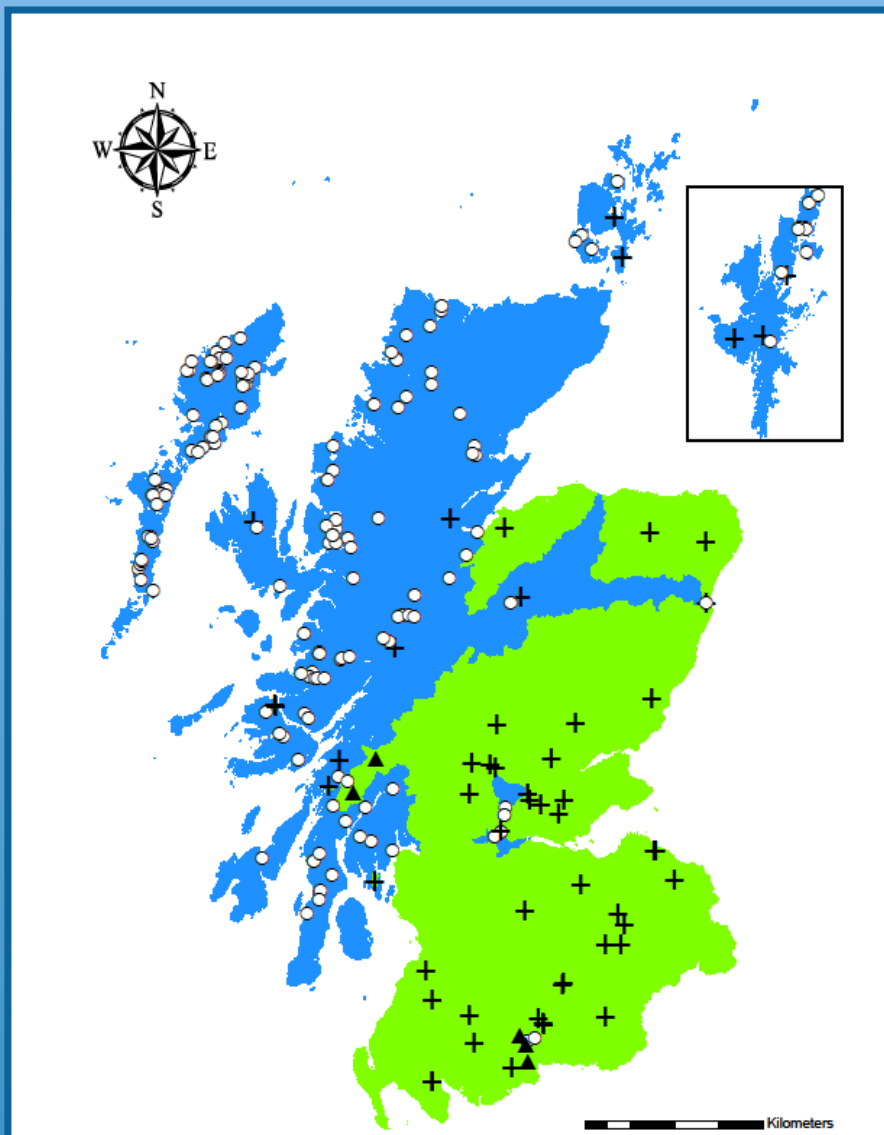
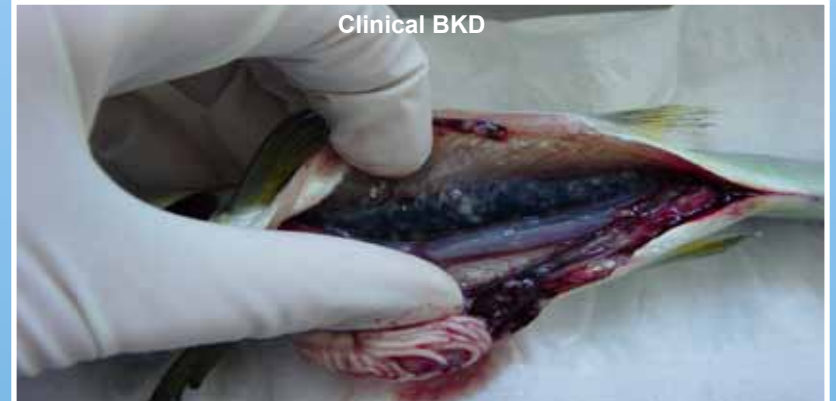


Figure 1: Compartment T (green); compartment S (blue); salmon farm (o); trout farm (+) and annexed trout farm (▲)

Method

- Locations of farms involved in freshwater movements in 2003 were mapped using ArcMap 9.3.1 (ESRI UK) (Figure 1).
- A mixed salmon and trout production farm was classed as “salmon” to preserve the higher health status.
- Supercatchments were designated either compartment T (only trout farms) or compartment S (only salmon).
- Supercatchments containing both salmon and trout farms were classed as compartment S.
- Five trout farms in compartment S were annexed to compartment T as the neighbouring salmon farms were hydrographically isolated.
- Using data from the 2003 live fish movement database the number of movements within compartments and between compartments (T to S only) were investigated.

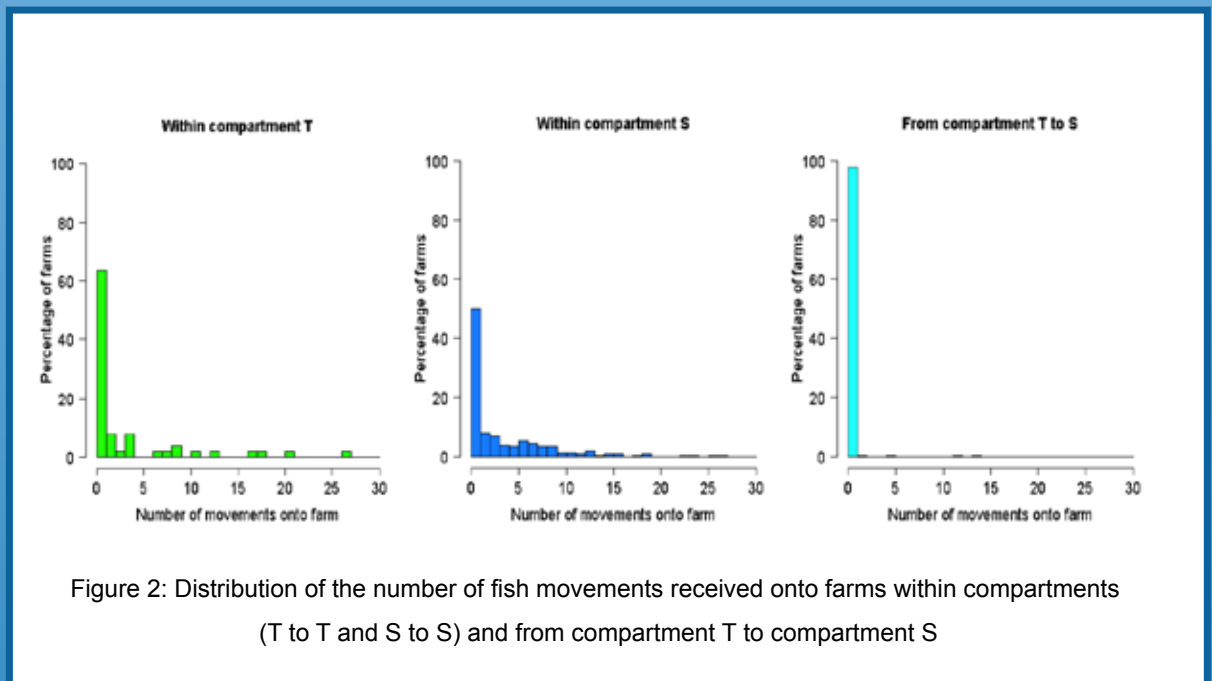


Figure 2: Distribution of the number of fish movements received onto farms within compartments (T to T and S to S) and from compartment T to compartment S

Results

- Salmon and trout farms fall into two geographic regions with trout farms located mainly in the south and east (Compartment T) and salmon farms in the north and west (Compartment S) of Scotland (Figure 1).
- The mean number of movements onto farms in compartment T from other compartment T farms was 3.31, compartment S from compartment S was 3.85 and from compartment T farms to compartment S was significantly lower at only 0.17.
- Figure 2 shows that distribution of the number of movements onto farms in compartment S from farms in compartment T compared to movements from within the same compartment are statistically very highly significant ($p < 0.001$ for comparisons with both T and S).
- Only 6 of the 207 farms in compartment S received fish from farms in compartment T.

Conclusions

- Use of a compartmentalised management system allows control of BKD to be targeted to species and geographic area.
- A simple compartmentalised management strategy can be applied to Scottish aquaculture for the control of BKD. This is supported by the low number of cross compartment movements.
- This strategy could be applied to the control of other fish pathogens such as *Gyrodactylus salaris* and infectious pancreatic necrosis virus (IPNV).



Further Reading: Munro, L.A., Wallace, I.S., Analysis of farmed fish movements between catchments identifies a simple compartmentalised management strategy for bacterial kidney disease in Scottish aquaculture, *Aquaculture* (2012), doi:10.1016/j.aquaculture.2012.02.007

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