

Monitoring monthly mortality of maricultured Atlantic salmon (*Salmo salar* L.) in Scotland



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The open-source Scottish salmon data can be used to create a industry-wide monitoring model for mortality

Objective

Develop **dynamic linear models (DLMs)** for **monitoring monthly mortality** of maricultured salmon in Scotland using **exclusively open-source data**. We intend to generate **warnings** to alert the stakeholders when the observed mortality is higher than expected.

Models

We developed 3 types of DLMs and compared them using the root mean square error (RMSE):

- **Univariate production cycle level DLM** – using only mortality data
- **Multivariate production cycle level DLMs** – using mortality and different combinations of open-source environmental data from satellites (e.g. water temperature, salinity, dissolved oxygen, etc.)
- **Univariate multi-level DLM** – modelling mortality at country, region and farm levels. A seasonal pattern at country level was introduced by using 2 harmonic waves.

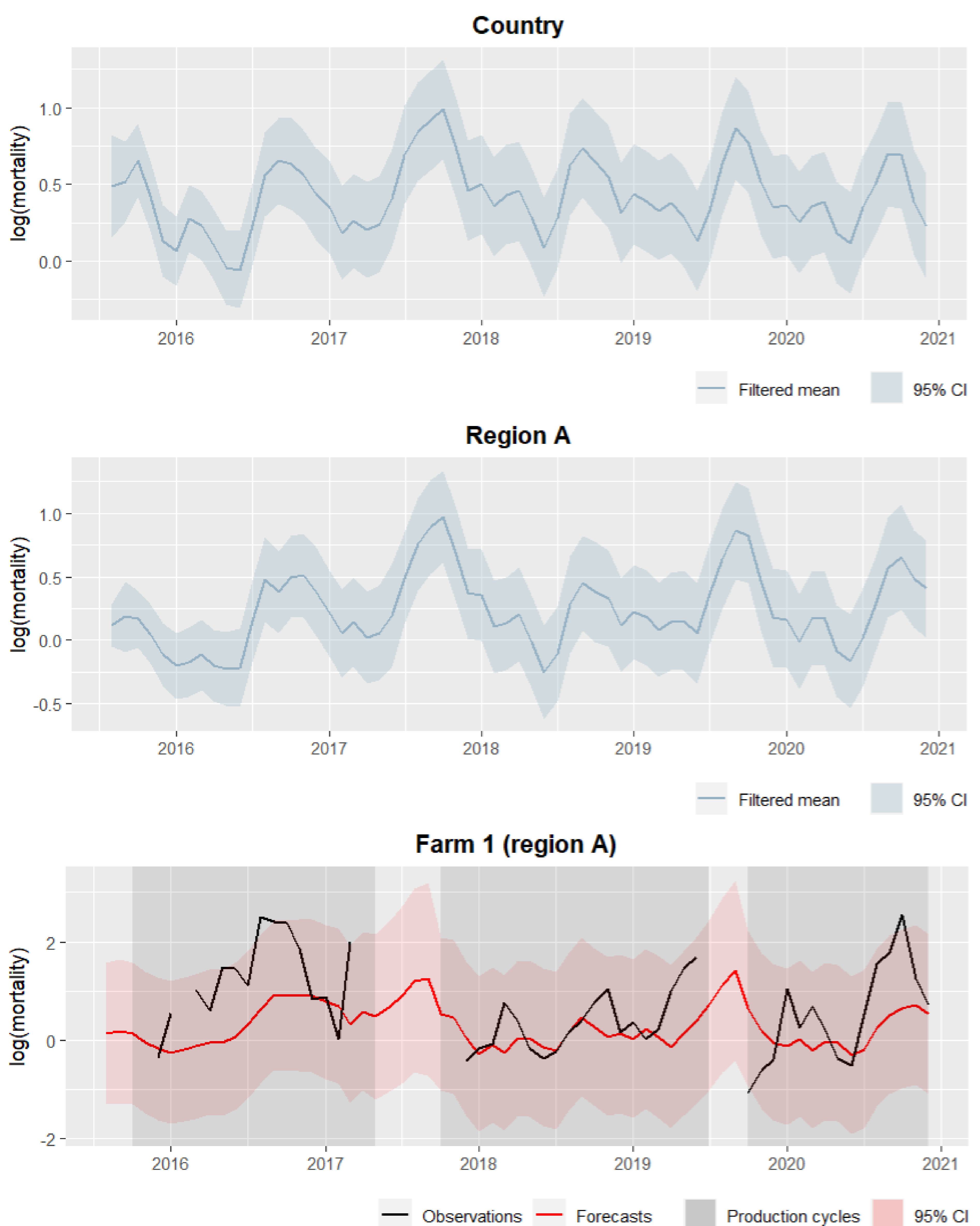
Results

DLM	RMSE
Univariate production cycle level	0.8603
Multivariate production cycle level (with salinity)	0.8586
Univariate multi-level	0.8284

Conclusions

- The **univariate multi-level model was the best model in monitoring salmon mortality**. It showed that it is relevant to utilize the hierarchical structure directly in the model to account for **correlations between farms and regions**.
- When taking the interconnections into account, we could see that mortality has a **seasonal pattern at country level**, and model it accordingly.
- If implemented in a near **real-time surveillance system**, the multi-level model enables **monitoring mortality at country and region levels and generate warnings at farm level**.

Best model - Univariate multi-level DLM



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101000494.

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