

Antimicrobial Use and Antimicrobial Resistance in the British Columbia Finfish Aquaculture Industry (2004-2018)

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Background

- The concurrent use and misuse of medically important antimicrobials pose a major Public Health threat.
- Antimicrobial use (AMU) is an important tool for disease management in aquaculture around the world [1,2].
- The ability of antimicrobial drug (AMD) residues to persist and select for AMR in the environment poses a huge eco-health risk [1,3].
- There remains a direct need for AMR/AMU surveillance to understand if AMU is linked to AMR in aquaculture [4].
- The objective of this study was to analyze AMR trends integrated with AMU data from BC finfish aquaculture from 2007-2018.

Methods

- Antimicrobial susceptibility data were obtained from the British Columbia Ministry of Agriculture via submissions to the Animal Health Centre (AHC) for 2007-2018.
- AMU data were provided by the Ministry of Agriculture and from feed mill prescriptions for 2004-2018 inclusive.
- Use data was standardized into mg/PCU_{slaughter}, which is composed of mg of AMU divided by biomass of treated fish (annual slaughter mass) in kg [5,6].
- Relationships between integrated AMR/AMU data for Atlantic salmon were explored using multilevel logistic regression with bacterial species as a random intercept in STATA[®] BE (version 17.0, College Station, TX).

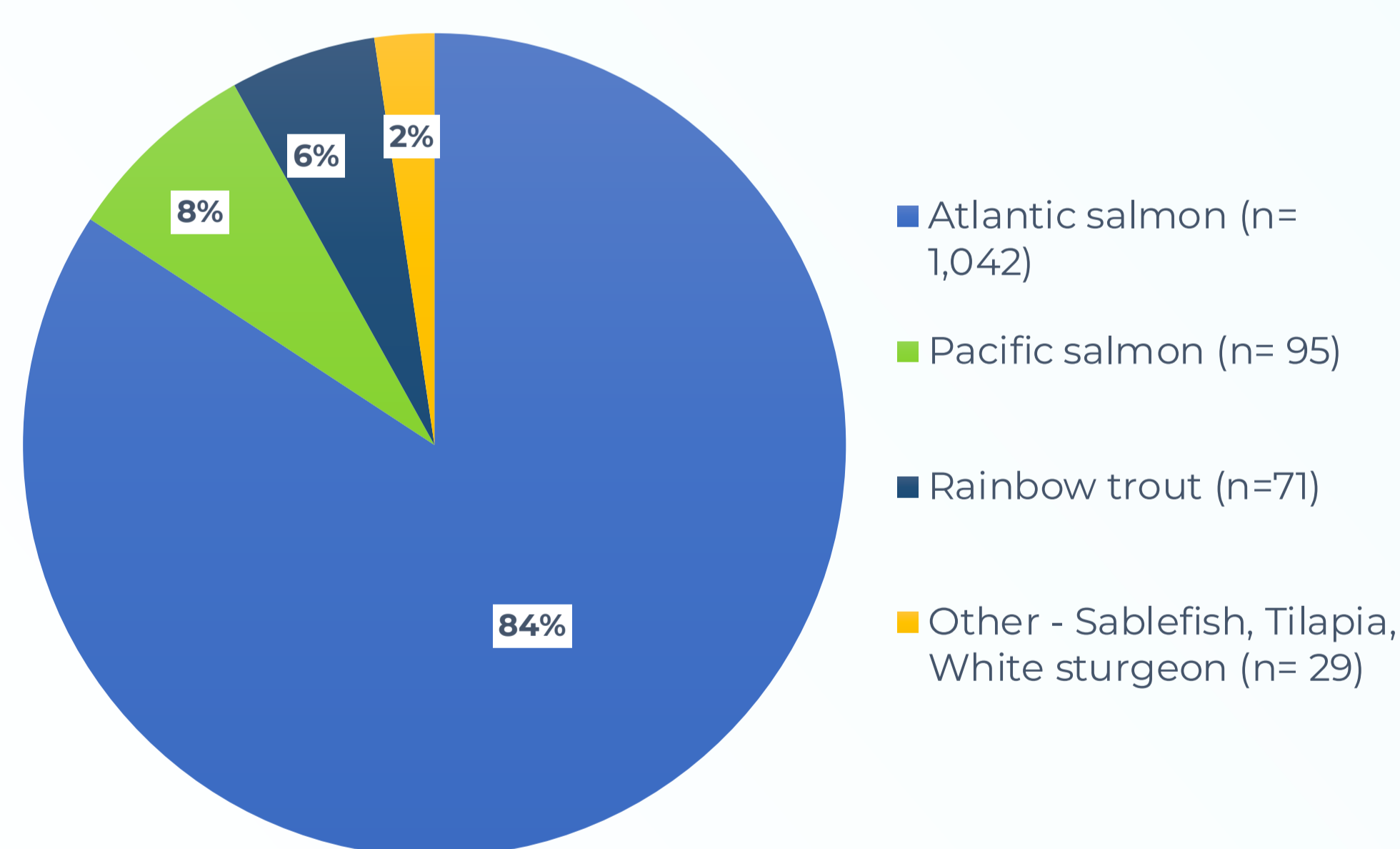
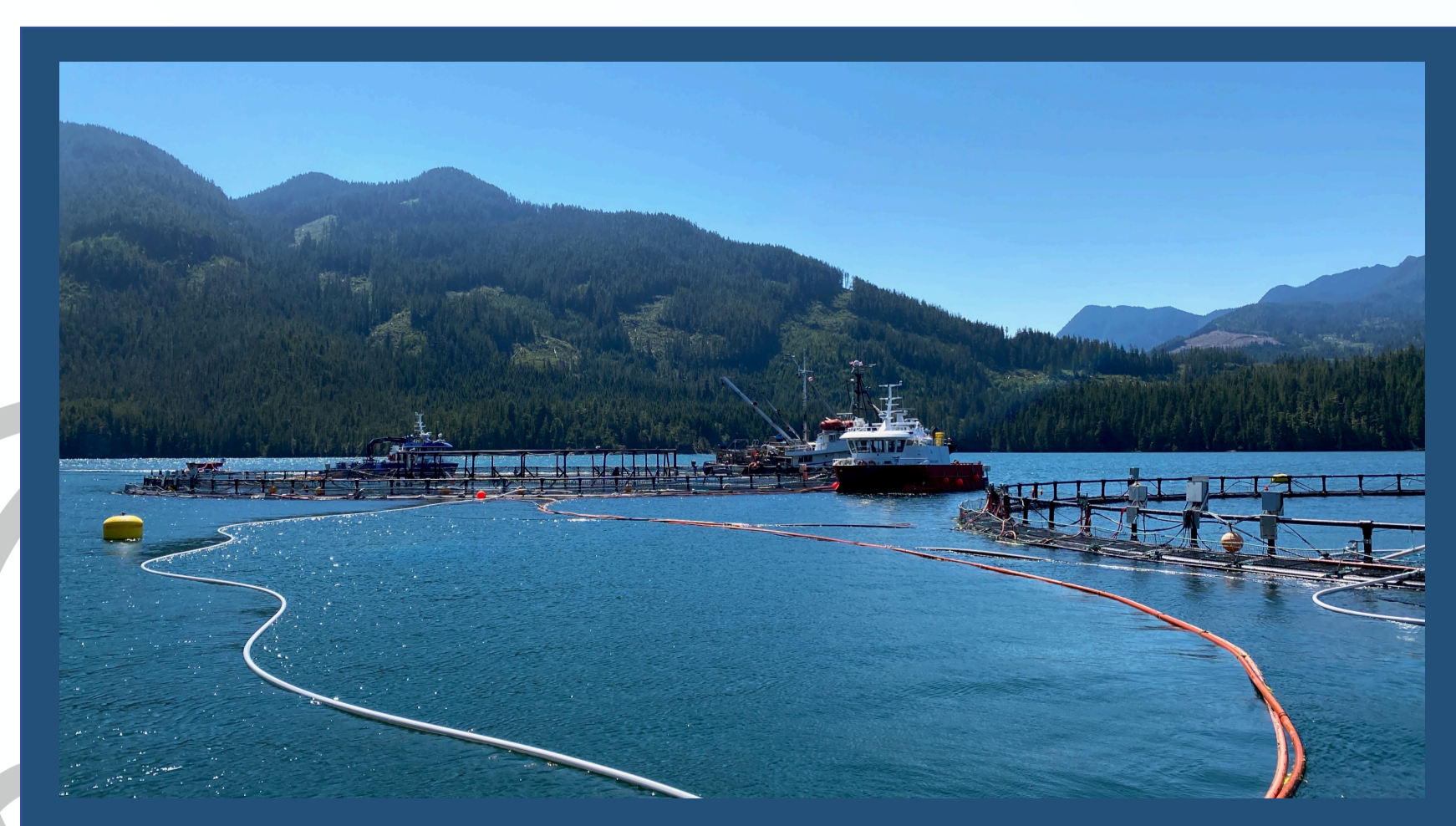


Figure 1. Source finfish of 1,237 unique isolates submitted to the AHC from 2007 - 2018



Results

- Submitted antimicrobial susceptibilities included florfenicol, oxytetracycline, sulfa-trimethoprim, and triple sulfa (sulphamerazine, sulphathiazole, and sulfphadiazine).
- Resistance to triple sulfa category drugs was the most significant in Atlantic salmon at 26.9% of isolates.
- Preliminary regression models on all Atlantic salmon isolates with a random intercept for bacterial species suggest that AMR is associated with resistance to other AMDs, but not directly with AMU.

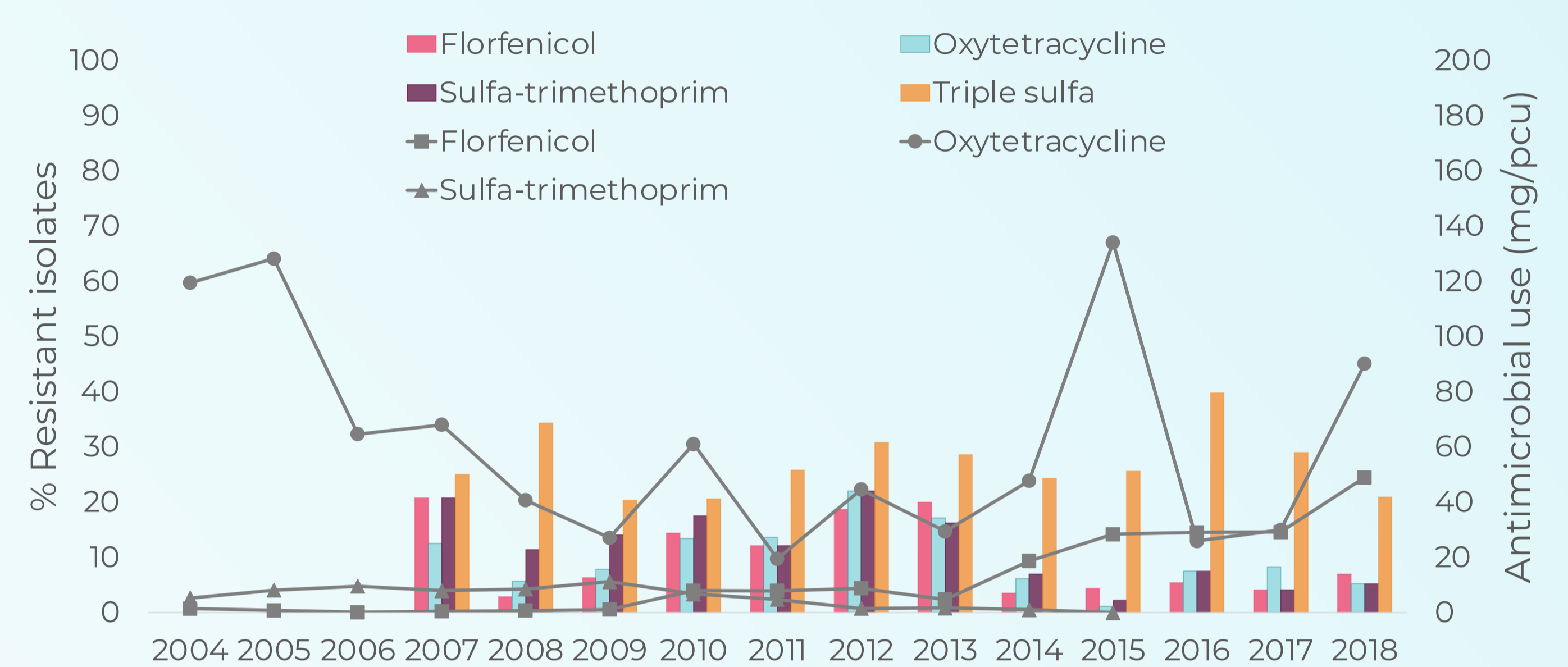
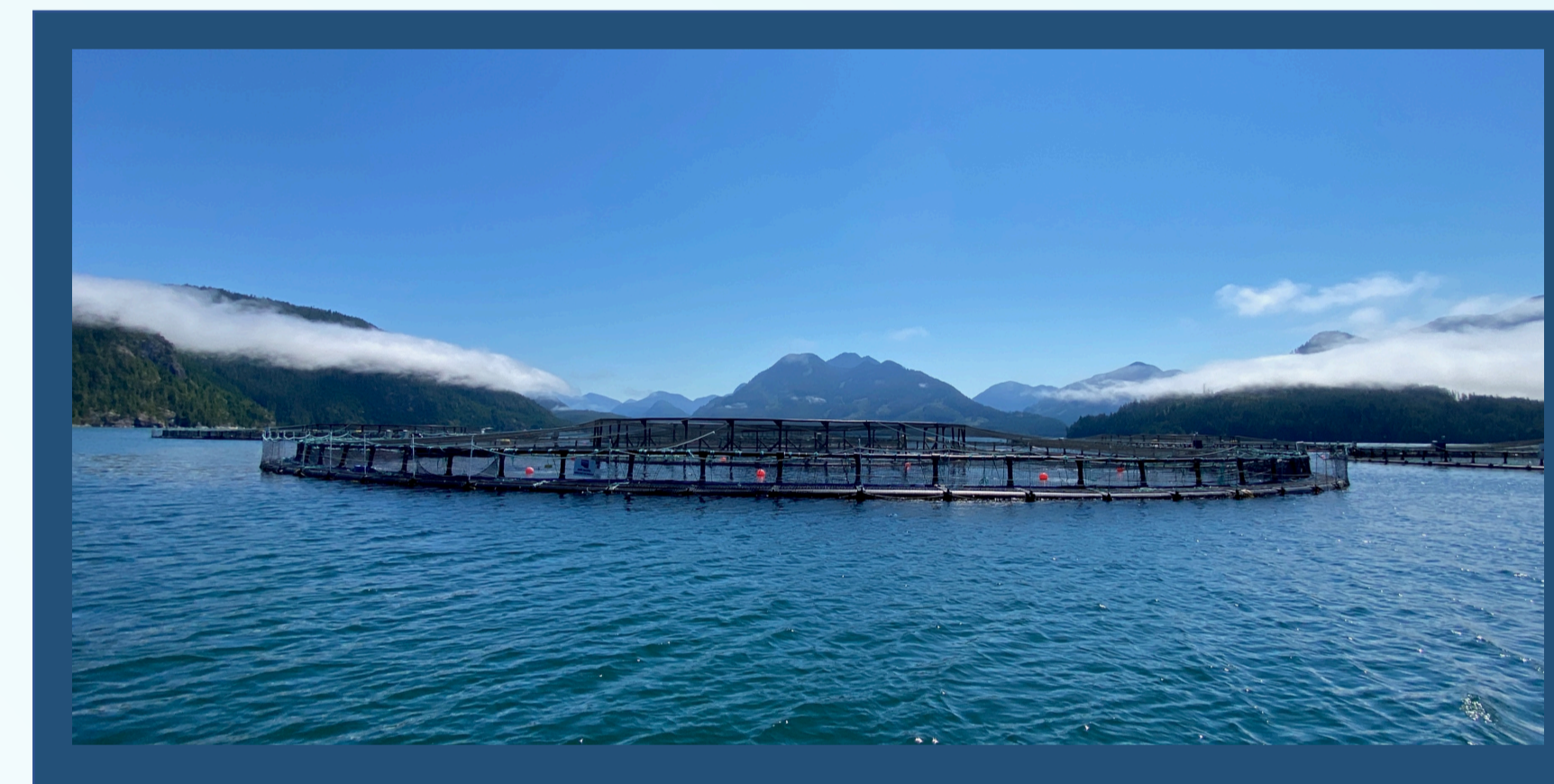


Figure 2. Antimicrobial use (mg/PCU_{slaughter}) and proportion of resistant isolates of all genera (n= 1,040) (%) for Atlantic salmon 2004-2018



Conclusion

- Overall, resistance was detected to most antimicrobials tested, but levels were generally low.
- The sparse annual data made interpretation challenging.
- Preliminary models have not shown any significant statistical association between AMU and AMR, although exploration and analysis is still ongoing.

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