

A META-ANALYSIS REVEALING THE TECHNICAL, ENVIRONMENTAL, AND HOST-ASSOCIATED FACTORS THAT SHAPE THE GUT MICROBIOTA OF ATLANTIC SALMON AND RAINBOW TROUT

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INTRODUCTION

- Intestinal microbiota are significantly affected by changes in environmental and host factors, and therefore impair or promote their growth performance and health under different conditions.
- There is a lack of research on the influence of technical, environmental, and host-associated factors on the salmonid gut microbiota, and the evaluated factors are often study specific.

METHODS

SCOPUS & NCBI

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All raw16S rRNA sequencing data of salmonid gut microbiota

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783 samples from 19 studies

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Data cleaning & processing

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Analyses & visualization

Alpha-diversity: Faith phylogenetic diversity and Shannon diversity

Beta-diversity: weighted UniFrac and Bray-Curtis

Linear Discriminate Analysis

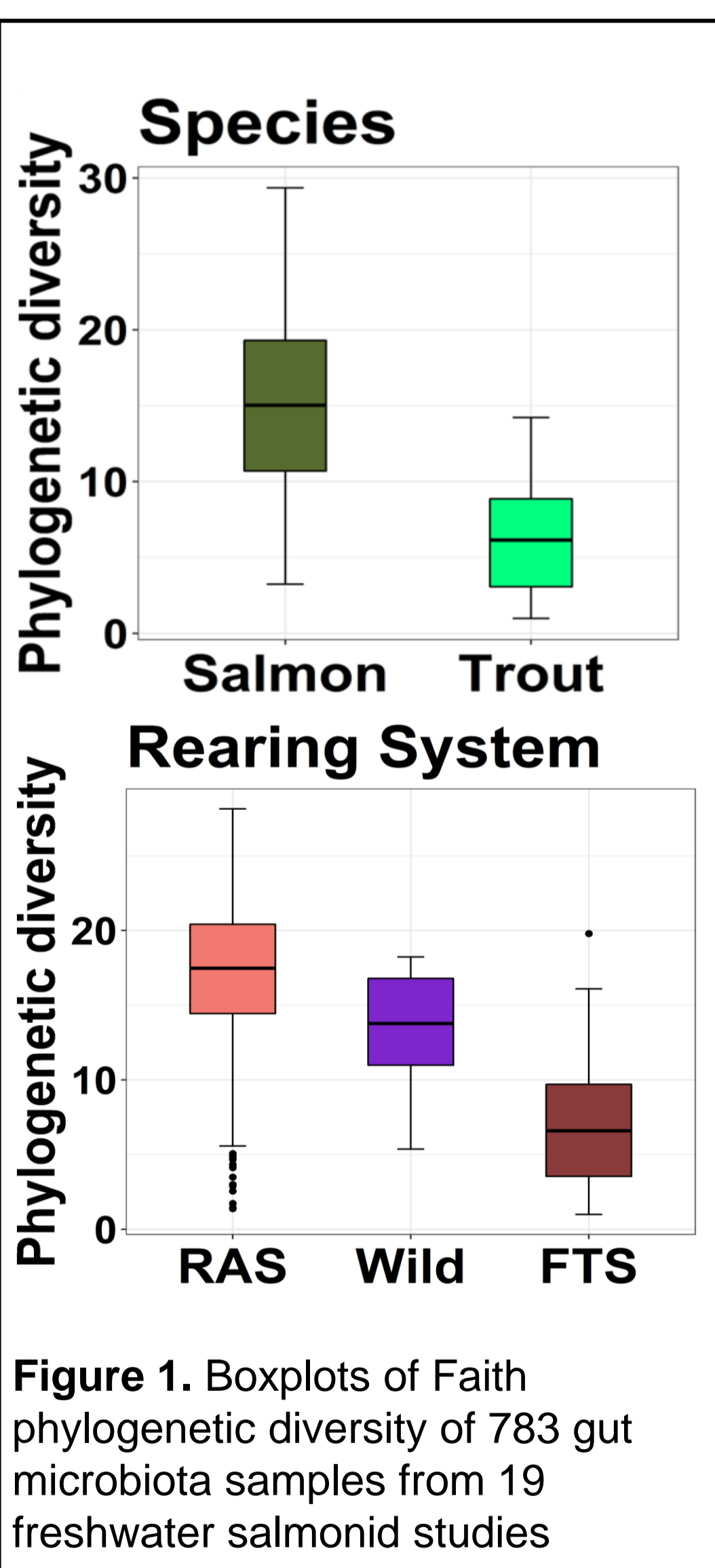
Generalized linear mixed-effect models

RESULTS & CONCLUSIONS

- All the factors mentioned significantly influenced alpha and beta diversity indices of salmonid gut microbiota.
- Host-associated and environmental factors influenced alpha diversity to a larger extent.
- Technical factors heavily influenced the beta diversity and clustering of gut bacteria, whereas their impact on alpha diversity was not as strong.
- Technical methodologies must be standardized and factors associated with host and environment need to be accounted for in the experimental design of studies.

Table 1. The impact of the influencing factors on the beta diversity of gut microbiota in freshwater salmonid fishes using weighted UniFrac and PERMANOVA

Factor	Factor type	Sample size	p-value	R squared	Pseudo-F
Target hypervariable region	Technical	783	<0.001	0.244	125.90
DNA extraction kit	Technical	783	<0.001	0.191	46.00
Diet	Environmental	745	<0.001	0.187	29.75
DNA polymerase	Technical	713	<0.001	0.173	32.46
Initial weight	Host-associated	706	<0.001	0.160	37.02
Rearing system	Environmental	572	<0.001	0.152	46.41
Flow rate	Environmental	406	<0.001	0.141	64.26
Daylight	Environmental	549	<0.001	0.123	54.48
Intestinal region	Host-associated	783	<0.001	0.116	51.26
Specific growth rate	Host-associated	356	<0.001	0.110	48.10
Feed conversion ratio	Host-associated	315	<0.001	0.090	38.16
Species	Host-associated	783	<0.001	0.081	68.45
Temperature	Environmental	680	<0.001	0.075	20.98
Weight gain	Host-associated	193	<0.001	0.061	25.51



ACKNOWLEDGEMENTS

FORMAS

REVIEWS IN Aquaculture

DOI: 10.1111/raq.12913

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