

GENOMIC INSIGHTS INTO RESISTANCE TO PROLIFERATIVE KIDNEY DISEASE IN RAINBOW TROUT: THE RESILTROUT PROJECT

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INTRODUCTION

- **Climate change** can induce physiological stress in fish, reducing their immune system and increasing susceptibility to infectious and parasitic diseases
- **Proliferative Kidney Disease (PKD)** is a serious parasitic disease in rainbow trout caused by *Tetracapsuloydes bryosalmonae* (Figure 1)



Figure 1. PKD in rainbow trout

- PKD is **temperature-dependent**, with outbreaks more frequent in farms using surface water
- PKD causes severe kidney inflammation and high mortality
- No effective treatment or vaccine currently exists

MATERIAL & METHODS

- **1,000** rainbow trout from an autochthonous genetic line were **naturally exposed to PKD**
- Dead fish were collected in spring–summer 2024, and survivors in winter 2024
- Genomic DNA was extracted
- PKD diagnosis was confirmed via end-point PCR and quantified by ddPCR (Figure 2)
- **Genotyping** using the Axiom Trout 57K SNP array (Figure 3), included 426 PKD-positive cases and 500 controls

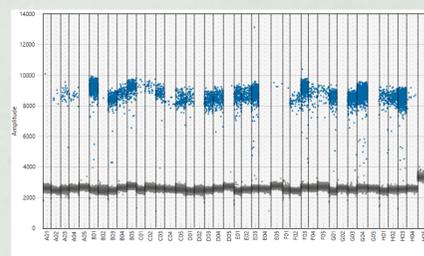


Figure 2. PKD quantified by ddPCR



Figure 3. Axiom Trout 57K SNP array

RESULTS

Frequency of positives analyses by ddCR (%)

- Very low (<10 copies/μL)
- Low (10–99 copies/μL)
- Moderate (100–999 copies/μL)
- High (1,000–9,999 copies/μL)
- Very high (>10,000 copies/μL)

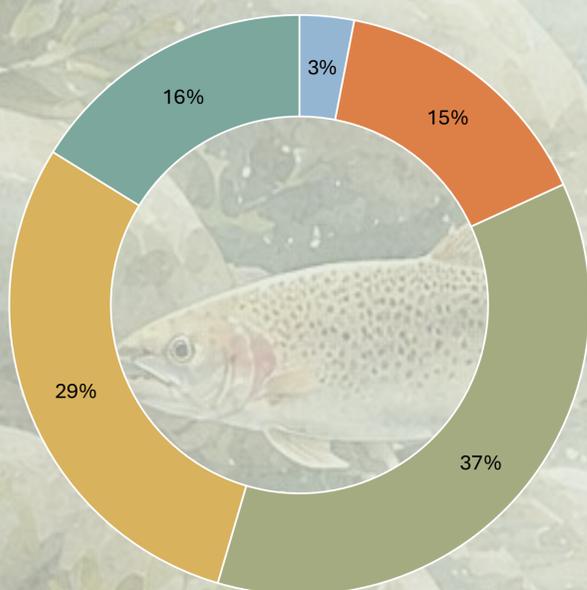


Figure 4. infestation levels revealed in ddPCR

- **ddPCR**, revealed five infestation levels ranging from very low to very high, but mainly represented in the categories moderate and high, based on the number of genome copies/microliter (Figure 4)
- GWAS revealed two significant SNPs on **chromosome 8** (73.22 Mbp and 38.44 Mbp) as reported in Figure 5
- Functional annotation and pathway analyses are currently in progress

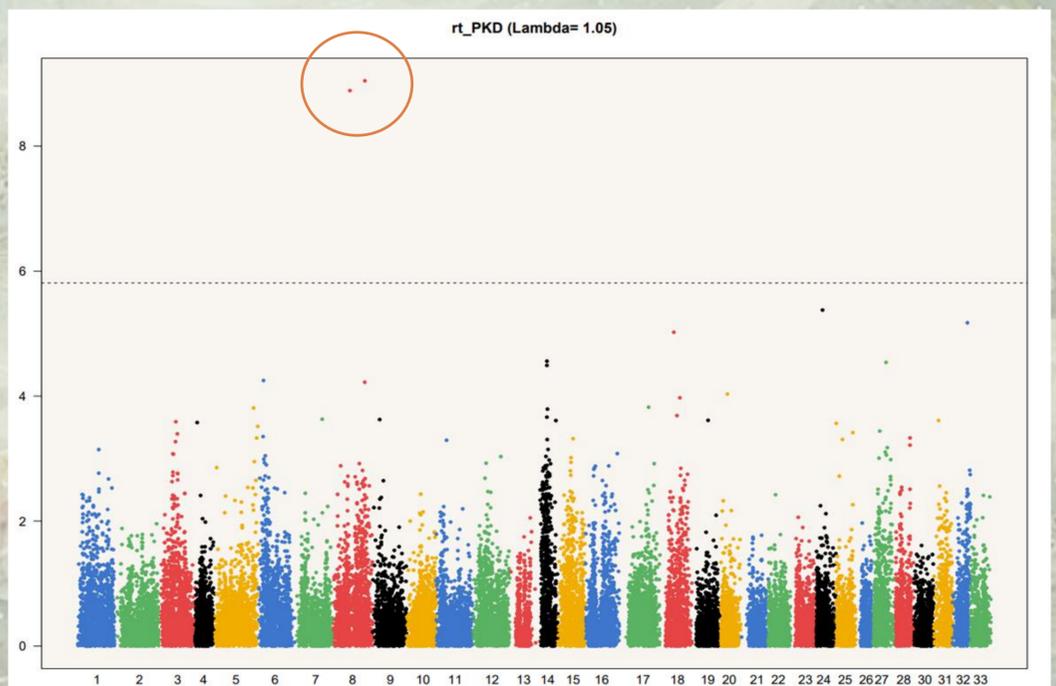


Figure 5. Manhattan Plot on chromosome 8

CONCLUSION

- **Two significant SNPs** linked to PKD were identified on chr 8
- Genetic marker will support selective breeding programs

NEXT STEPS

- **Selective breeding program development**, a step forward in enhancing PKD resilience in rainbow trout