The effect of wading on trout egg, fry and parr mortality

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Research question and objectives

This study experimentally tested whether angling-associated wading in rivers induces mortality in brown trout (*Salmo trutta*) eggs, fry, and parr. Brown trout eggs develop within gravel beds, and wading often occurs prior to fry emergence.
It has also been unclear whether the disturbance caused by wading would affect the predation of trout by Eurasian perch (Perca fluviatilis) or other piscivores. To address these questions, we experimentally waded in gravel-bottomed stream channels stocked with 0-year-old and 1-year-old brown trout, with and without wild-caught piscivorous perch (picture 1).

Methods

Experiments were conducted at the Natural Resources Institute Finland's Kainuu Fisheries Research Station and the University of Eastern Finland in spring and summer 2025. Hatchery-produced brown trout eggs and larvae were used alongside wild-caught Eurasian perch.
Three major experimental setups were employed:

1. **Laboratory trials**: wading was performed on eyed stage eggs;
2. **Outdoor channel experiments:** eggs in gravel-filled flow-through boxes were exposed to wading at different developmental stages (picture 2);
3. **Juvenile trials:** 0- and 1-year-old trout were released into outdoor pools and repeatedly exposed to wading, with and without predatory perch.

Picture 1. Outdoor channel pool.

Picture 2. Boxes in the second setup.

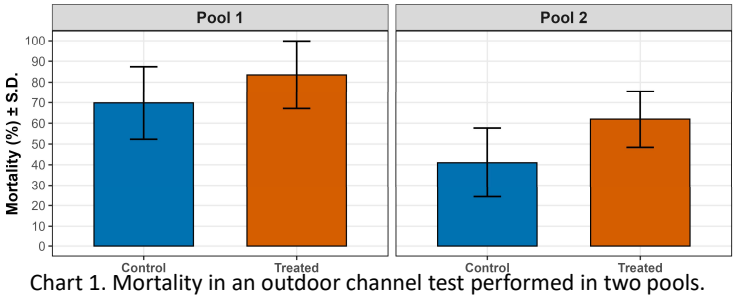

Chart 1. Mortality in an outdoor channel test performed in two pools.

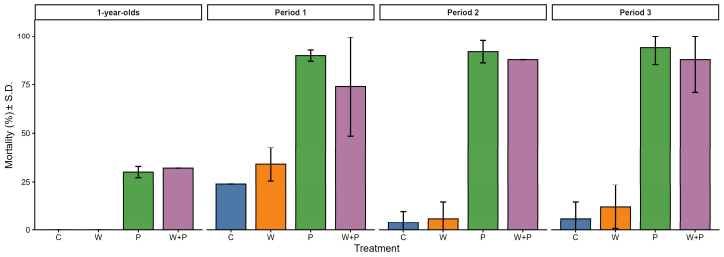

Chart 2. Mortality in juvenile trials. The abbreviations used in the treatments are C = control, W = wading, P = predator and W + P = wading and predator.

Results & Conclusions

In the laboratory trials, the eggs proved to be surprisingly tolerant, and no significant mortality was observed, likely due to the stable gravel structure of the boxes used. In contrast, the outdoor box experiments revealed a net mortality rate of around 17% caused by 10 minutes of wading, suggesting substantial losses of eggs and fry if wading occurs frequently or intensely (chart 1).
Wading alone did not cause mortality among 0-year-old and 1-year-old juveniles. However, perch predated nearly all brown trout despite the plentiful availability of stone shelters (chart 2). Interestingly, wading reduced perch predation, indicating that wild perch were more sensitive to disturbance than hatchery-produced brown trout.
In conclusion, it is necessary to prevent wading in spawning areas before fry emerge from the gravel, whereas free-swimming juveniles appear relatively tolerant to wading disturbance.

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