



Increased experimental noise levels can affect fish species differently



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Human activities have changed the acoustic environment on land and underwater. Increased sound levels can affect physiology and behaviour.

Anti-predator strategies and foraging ecology vary among species.

Do elevated noise levels affect fish as prey and as predators?

Are species affected differently?

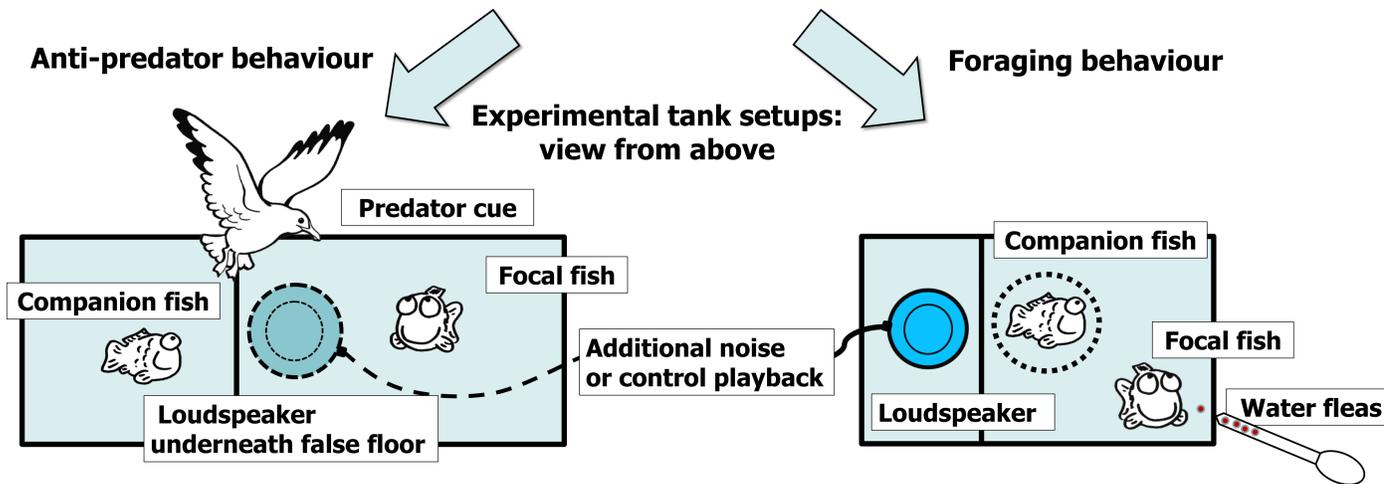


Fig. 1. Additional noise from ship noise recordings and control noise from ambient noise recordings played while predator cue (plastic seagull) released. Time to respond to predator compared between treatments.

Fig. 2. Additional noise from ship noise recordings and silence (control) played for 5 min. Live water fleas introduced every 20 s. Foraging and stress related behaviour compared between treatments.

Three-spined sticklebacks (*Gasterosteus aculeatus*)



and European minnows (*Phoxinus phoxinus*)

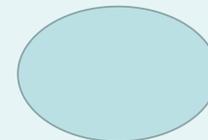


share similar habitats, predator and feeding ecologies, but differ in their possession of body armour.

Press to listen to additional noise treatment



Press to listen to control noise treatment



Fish as prey: anti-predator behaviour

Fish as predators: foraging behaviour

Response latency: % Non-responsive

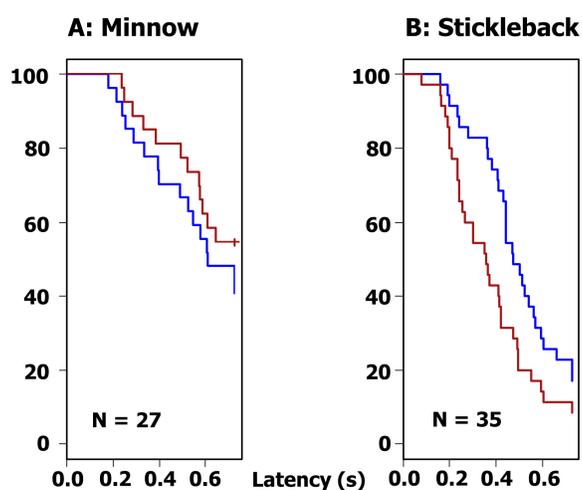


Fig. 3. Latency to respond to a predatory stimulus was not affected by noise treatment in minnows (A), whereas sticklebacks responded significantly more quickly during playbacks of additional noise than during control conditions (B). Plots of Kaplan-Meier estimate from mixed model Cox proportional hazards regression, with non responders included as right-censored maximum-latency data. Fish tested in a repeated measures design.

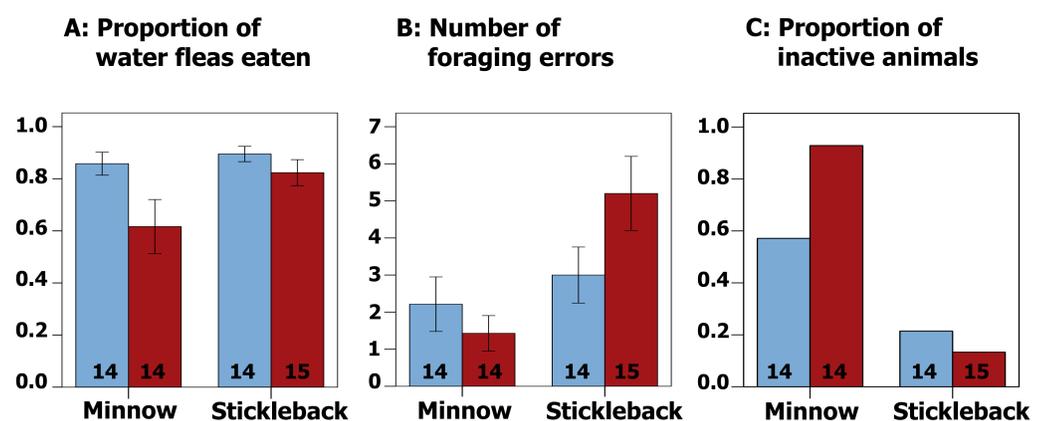


Fig. 4. Playbacks of additional noise significantly reduced food consumption regardless of species (Mean \pm 1 SE responses, A). Sticklebacks tended to increase foraging errors (water fleas lost, missed or non-food items attacked) during additional noise playbacks (Mean \pm 1 SE responses, B), while there was a tendency of more minnows being inactive during additional noise playbacks than during control conditions (C). Fish tested in an independent-measures design. Voellmy, I.K. et al., *Anim. Behav.* 89, 191-198 (2014).

Increased noise levels have the potential to affect behaviour important for survival and these effects can differ between species.

Future field-based experiments are needed to assess effects in the wild across different noise types and to investigate potential consequences for survival and populations.

Pictures used for figures 1 and 2 originate from
Fish: <http://www.flickr.com/photos/hamburgerjung>
Seagull: <http://www.supercoloring.com/pages/gull-3>

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Your questions and remarks are welcome! Please note them here

