Fish flow refuges

#4 infosheet

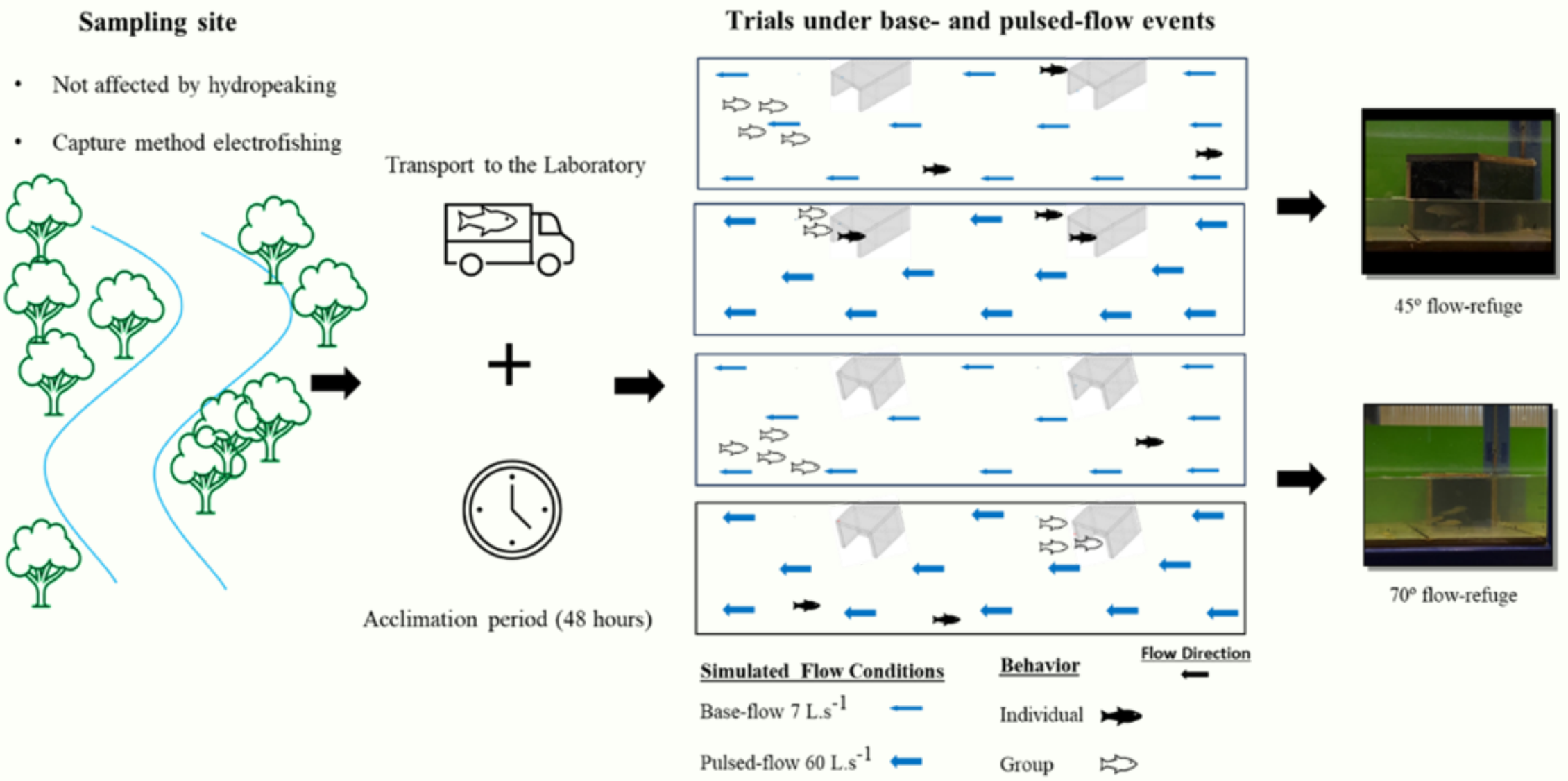
Hydropeaking caused by small-scale hydropower plants creates **rapid changes** in the intensity, frequency, and persistence of river flows. These changes can induce **stress in fish** across all life-stages and, may **negatively impact fish communities**. Rapid increases in the flow velocity may cause fish to avoid unstable habitats, seeking out **nearby refuges to reduce their energy expenditure**.

Fish Flow Refuges

In laboratory experiments, **lateral fish flow refuge** proved to be a **successful measure** to protect fish from the flow intensity caused by hydropeaking downstream of hydropower plants.

Methodological Approach & Results

We investigated **two lateral fish flow refuges** designed for cyprinids facing pulsed-flow conditions (60 l/s), focusing on their performance considering **different approaching angles**. Analyzing fish **behavior, physiological** responses (i.e., glucose and lactate) and **hydraulics**, we found that the 45° flow-refuge was more used than the 70° during hydropeaking, and the physiological responses were the lowest for the 45° in base flow conditions.



Conclusions

These results indicate that the **45° flow-refuge** is the most adequate for Iberian barbels under hydropeaking conditions. This emphasizes the crucial role of the **approaching angle in designing effective flow refuges**, providing valuable insights for optimizing habitat mitigation measures in dynamic aquatic environments.

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