

# Cultured fish: integrative biology and management of domestication and interactions with wild fish

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## ABSTRACT

Fish culture for commodity production, fisheries enhancement and conservation is expanding rapidly, with many cultured species undergoing inadvertent or controlled domestication. Cultured fish are frequently released, accidentally and deliberately, into natural environments where they may survive well and impact on wild fish populations through ecological, genetic, and technical interactions. Impacts of fish released accidentally or for fisheries enhancement tend to be negative for the wild populations involved, particularly where wild populations are small, and/or highly adapted to local conditions, and/or declining. Captive breeding and supplementation can play a positive role in restoring threatened populations, but the biology of threatened populations and the potential of culture approaches for conserving them remain poorly understood. Approaches to the management of domestication and cultured-wild fish interactions are often *ad hoc*, fragmented and poorly informed by current science. We develop an integrative biological framework for understanding and managing domestication and cultured-wild fish interactions. The framework sets out how management practices in culture and for cultured fish in natural environments affect domestication processes, interactions between cultured and wild fish, and outcomes in terms of commodity production fisheries yield, and conservation. We also develop a typology of management systems (specific combinations of management practices in culture and in natural environments) that are likely to provide positive outcomes for particular management objectives and situations. We close by setting out avenues for further research that will simultaneously improve fish domestication and management of cultured-wild fish interactions and provide key insights into fundamental biology.

**Keywords:** Domestication, selection, plasticity, stocking, fisheries enhancement, captive breeding, supplementation, culture-based fisheries, aquaculture, escapes