

# SPECIES KNOWLEDGE STRENGTHENS WATER PROTECTION: THE IMPORTANCE OF RECOGNISING UNDESCRIBED SPECIES FOR HABITAT CONSERVATION AND RESTORATION

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## ABSTRACT

Human activities are accelerating biodiversity loss but the ability to understand and stop this decline depends on accurate species identification which underpins the description of biodiversity. Significant taxonomic knowledge gaps still exist, especially in aquatic ecosystems, leading to ineffective conservation planning. In Switzerland, around one-fifth of the over 120 fish species are part of species complexes and remain undescribed. Reliable species identification is crucial for conservation, as misidentification leads to inaccurate species distribution data, ineffective habitat management, and lack of legal protection. Continuous monitoring and a strong understanding of taxonomy are essential to identify both native and emerging species outside their natural habitats. In Switzerland, species confusion has occurred, such as misidentifying *Scardinius hesperidicus* as *S. erythrophthalmus*, and the southern spiny loach *Cobitis bilineata* as *C. taenia* for decades. Across the Alps, taxonomic work has revealed distinct lineages of whitefish (*Coregonus* spp.), char (*Salvelinus* spp.), bullhead (*Cottus* spp.), gudgeon (*Gobio* spp.), minnow (*Phoxinus* spp.) and bearded goby (*Barbatula* spp.), which were overlooked in previous conservation planning. Here we attempt to utilize new and deep taxonomic knowledge alongside the understanding of species' adaptations and responses to environmental changes, including climate change, and complement this with systematic conservation planning approaches – with the aim to improve conservation strategies and enhance protection of ecosystems. This interdisciplinary study aims to prevent biodiversity loss by recording aquatic biodiversity and describing unknown species, where taxonomists and ecologists collaborate to generate suitable habitat conditions models, improving understanding of species roles in ecosystems and assessing their vulnerability to human and climate impacts. These models help prioritize regions for conservation efforts, identifying areas needing protection, restoration, or attention due to climate change.

**Key-word:** biodiversity, freshwater fishes, nature protection, species distribution data.

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