

Breeding habitat change of Alpine newts, *Ichthyosaura alpestris*, in the presence of Goldfish, *Carassius auratus*

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As many other amphibian species, the Alpine newt, *Ichthyosaura alpestris*, is locally declining because of fish introductions in its aquatic habitat. The Goldfish, *Carassius auratus*, plays a major role in this decline for a variety of reasons that remain to be explored. Through an experimental approach, we aimed to study the distribution of newts when goldfish is present in a part of the habitat network. We have also estimated the reproductive success of newts living in such habitat networks with and without goldfish. We have used an experimental design constituted by aquariums that were divided into two tanks filled with water and joined by a terrestrial platform. We have analysed the response of eight groups of newts in configurations involving either or not goldfish in one of the two tanks. We found out that the Alpine newt is able to escape fish by changing of aquatic habitat, i.e. tank in our design. Newt populations living in a habitat configuration including goldfish exhibited fewer courtships and laid fewer eggs than newts from populations living in a configuration without goldfish. Our results show that newts living in fishless networks are not attached at a single reproduction area during the breeding season: they make several movements between aquatic areas through land connections, showing the dynamic of a patchy population. In conclusion, our study points out that the Alpine newt is able to use refuge areas, particularly when its habitat is fished and an alternative aquatic habitat is available. Even if these areas are not fully able to compensate the impact of goldfish at the network scale, the construction of refuge ponds could help to maintain newt populations living in fish-stocked areas.

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