

Response times of amphibian populations to replacement pond following road construction

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Habitat degradation, road construction and traffic are among the anthropogenic threats facing wildlife from both aquatic and terrestrial habitats. In the case of Amphibians, pond replacement programmes have often been used in response to fragmentation and destruction of suitable habitats. There is, however, an urgent need to follow their success in order to better understand and compensate for the decline of amphibian populations. Following construction of a highway in western France, a restoration project was initiated and the success of restoration efforts was monitored. Eight replacement ponds were created consistently with the old pond characteristics and taking into account the amphibian species present in each. Amphibian diversity was recorded every year during the breeding period before original ponds were destroyed and for four years following pond creation. Species richness initially declined following construction of the replacement ponds but generally returned to pre-construction levels. Species diversity followed the same pattern but took longer to reach the level of diversity recorded before construction. Pond surface area, depth, and sun exposure were the most significant habitat characteristics explaining both amphibian species richness and diversity. Similarly, an increase in the number of vegetation strata was positively related to anuran species richness, indicating the need to maintain a heterogeneous landscape containing relatively large open wetland areas. These results highlight the species-specific dynamics of the colonization process and recovery time, including an increase in the number of replacement ponds inhabited over time by some species and, in some cases, an increase in population size. We suggest that successful replacement ponds can be designed over a relatively short time around simple habitat features, providing clear benefits for a range of amphibian species, which will have positive cascading effects on local biodiversity.