Dammed river: Short- and long-term consequences for fish species inhabiting a river in a Mediterranean climate in central Chile

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Abstract

The presence of a dam disturbs river flow, which in turn directly affects the communities and evolutionary potential of riverine species. To detect the ecological effects of a dam on genetic diversity, genetic structure, and their progress in time, two riverine fishes living upstream and downstream of an irrigation reservoir were studied at two periods after its construction in 2004 in central Chile. Samples of the Neotropical silversideBasilichthys microlepidotusand the pencil catfishTrichomycterus areolatuswere obtained 2 and 7 years after the Corrales Dam was built. The microsatellite DNA variability of both species upstream and downstream of the dam was analysed. Fish analysed 2 years after dam construction did not show genetic differences between upstream and downstream populations; however, fish obtained 7 years after dam construction showed differences between populations above and below the dam and differences from individuals collected 5 years earlier. The current effective population sizes of both species were smaller in samples obtained upstream than in samples obtained downstream. Simulations showed a migration equal to zero as most probable after reservoir construction, suggesting that the dam is an impermeable barrier to the movement of individuals of these species. These results showed that population fragmentation in time could be related to the barrier imposed by the dam. In a scenario of no new contact between populations located upstream and downstream of the dam, the simulation predicts a reduction of genetic diversity ranging from 3.98 to 8.09% over the next 60 years. Analyses suggest that the Corrales Reservoir may be affecting the evolutionary potential of the populations upstream and downstream from the dam.

Palabras clave

Palabras clave de autor: Basilichthys microlepidotus; effective population size; genetic diversity; irrigation reservoir; population genetic structure; Trichomycetrus areolatus
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