



**ADVANCES IN THE POPULATION
ECOLOGY OF STREAM SALMONIDS - IV**

INTERNATIONAL SYMPOSIUM

**May 25-29, 2015
Girona, Spain**



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Déposito Legal: xx-XXXX-2015

Upstream migration of adult Atlantic salmon (*Salmo salar*) in the River Lee, an Irish river regulated for hydroelectricity generation

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The Atlantic salmon populations of the River Lee (mean annual discharge 42 m³s⁻¹, catchment area 1254 km²), which is located in south-western Ireland, have been adversely affected by construction of two hydroelectric dams in the 1950s. Though mitigation measures were adopted, including construction of Boreland - Mc Donald fish lifts and extensive stocking with hatchery-reared fry, these conservation actions have not significantly restored the natural populations of salmon in the areas upstream of the dams. We have undertaken acoustic telemetry studies of upriver movements adult salmon (n = 39). These indicated that the fish could use the fish lift at the lower dam for both upstream and downstream movements. It was also apparent that low river discharge, associated with either natural low flow conditions or low hydropower generation levels, resulted in very low use of the fish lift during the periods studied. Fish released above this dam migrated either to one nearby tributary river or only as far as the 2nd dam and did not to the upper section of the catchment. We also analysed available records of adult salmon, obtained from fish ladder counters and rod angling log books, and this provided further evidence of the adverse effects that the regulated discharge patterns have on upstream migration of potential spawner salmon in the river. Electrofishing surveys of juvenile salmonids in tributary streams confirmed that in areas upstream of the dams, which represent 73% of the catchment area, they were largely confined to areas stocked with hatchery-reared juvenile fish. This contrasts with the catchment area (27%) below the lower dam, where a self-sustaining wild salmon population occurs. A review of the current salmon management plan for Atlantic salmon in this river system is recommended.

Conservation genetics of riverine salmonids in the Southern Alps: a synthesis.

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Riverine salmonids (trouts and grayling) represent important flagship species of Southern Alpine freshwater fish fauna, to date seriously endangered by various anthropogenic pressures. Among these, genetic pollution, fuelled by stocking of non-native conspecifics, is recognised as a primary stressor. Hybridisation, introgression and, finally, the loss of native taxa are potential consequences of these improper fisheries management actions. Here, we summarise the results of recent broadscale conservation studies focussing on marble trout (N=1,246), brown trout (N=467) and European grayling (N=683) and based upon multilocus-genetic (mtDNA sequencing and microsatellite genotyping) as well as fisheries data. We outline species-specific responses in terms of secondary contact between native and foreign taxa. Following an altitudinal gradient, we point to the almost complete absence of Adriatic brown trout and widespread expansion of hatchery-derived Atlantic brown trout in high-alpine brooks. Downstream, we compare differential patterns and extents of hybridisation and genetic introgression in both marble trout and Adriatic grayling populations. While exotic genetic profiles were monospecific (Atlantic) in marble trout hybrids, multiple exotic source populations were identified in introgressed grayling, reflecting differences in stocking histories of trout and grayling. So forth, we propose management units, fundamental to conserve the residual genetic legacy of indigenous salmonids in the Southern Alps. Finally, we press for updated fisheries management actions. This revised management catalogue includes changes in stocking practices, fisheries regulations as well as the routine adoption of genetic assistance in supplementation programs.