



Hatchery Stocking Assessment

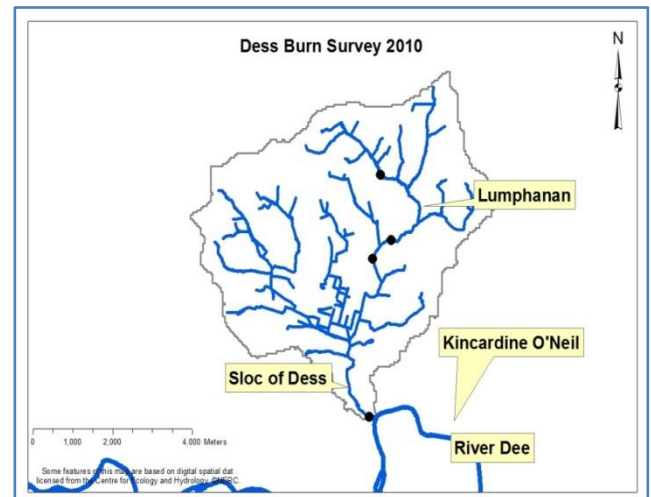
Background

Salmon fisheries have a long history of using hatcheries as an enhancement measure. Using fish farming techniques, it is relatively easy to produce large numbers of juvenile salmon for stocking. However, the success of these programmes is very variable, depending on factors such as water quality, stream habitat and carrying capacity.

The Dess burn is a medium sized tributary of the Dee's middle reaches, with an impassable waterfall (the Sloc of Dess) 1 km from its mouth, which denies salmon access to most of the burn.



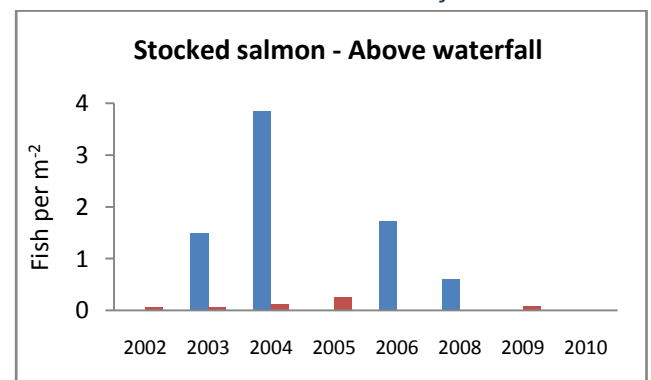
A private hatchery was created in 2000 to stock salmon upstream of these falls, using adult salmon entering the burn as broodstock. Fertilised eggs are hatched in raceway troughs then fry are fed in tanks before release into good habitat above the falls. The hatchery aims to stock 81,000 salmon per year, with the fish being put out as large fry in late summer/autumn. The RDT carries out electric fishing surveys of the stocking areas to follow the progress and survival of these salmon.



Benefits

No juvenile salmon were found in stocked areas above the falls in surveys undertaken in 2010. Previous surveys have also found no hatchery fry in some years but conversely high densities of fry in other years. However, all of the eight annual surveys have found salmon parr present in the stocking area in only very low numbers, or absent completely (average parr density of 0.067 m⁻²). This reflects the exceptionally low (or zero) survival rates of the stocked fry in their first year.

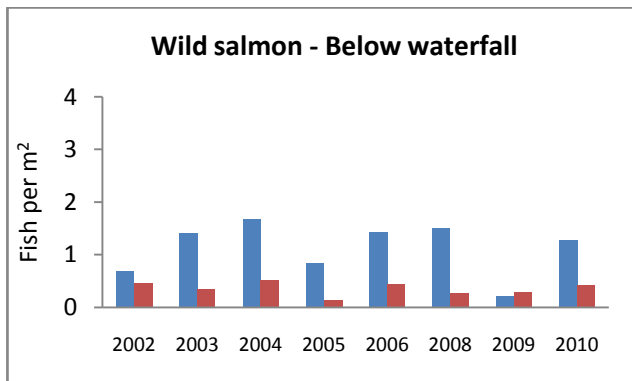
Densities of salmon fry (■) and parr (■) in stocked areas above the waterfall





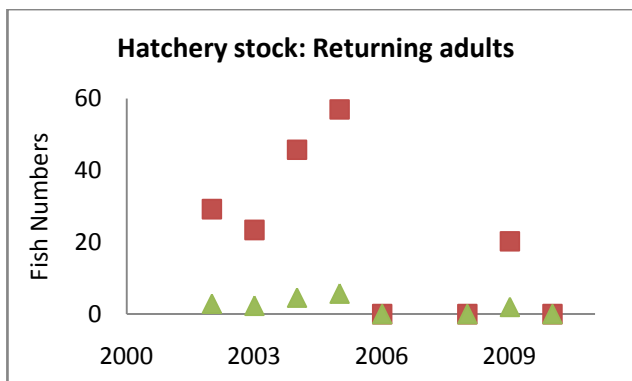
The River Dee Trust

In the lowest area of Dess burn, below the waterfall, fry (■) and parr densities (■) are consistently greater than above the waterfall (average density 0.4 m^{-2}).

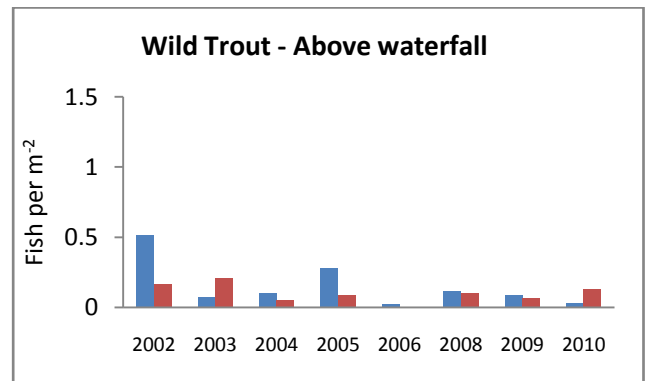


Survival rates of wild salmon parr through to adults returning to the river, if applied to the hatchery parr densities found in the Dess burn, indicate that the extra number of adult salmon produced for the Dee would vary between 0 and 57. With an average rod exploitation rate of 10%, the hatchery programme is predicted to contribute, at most, six salmon annually to the Dee's rod catch.

Predicted number of adult salmon produced from the hatchery stocking (■) and additional fish in the Dee rod catch (▲)



Trout fry (■) and parr (■) populations are much lower above the waterfall than below but have shown no clear trend in the area stocked with salmon fry.



Conclusions

Planting hatchery reared salmon into Dess burn above the waterfall has had little impact on smolt production, returning adult numbers and therefore on Dee rod catches. Although high densities of hatchery fry were found in some years, survival rates of these fish in their first year are very low, resulting in the low (or zero) parr densities found.

Hatchery fry were stocked into habitat comparable to habitat in the burn below the waterfall, yet densities of wild parr are much higher below the waterfall. The poor survival of hatchery fry stocked above the waterfall may be due to a loss/reduction of their 'natural' behaviours during their hatchery-rearing. This can include behaviours involved in obtaining food, avoiding predators and interacting with other salmon (e.g. defending territories); all affect growth and survival of the fish once released into the wild. Furthermore, stocking fry out into the wild at high densities leads to high mortality rates due to stresses on feeding and use of habitat.

This is one of a series of bulletins that highlights some of the RDT's work in restoration and monitoring. No. 006