

The Sustainability of Atlantic Salmon (*Salmo salar* L.) in South West England

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ABSTRACT

Conservation studies have generally focused on the environmental and biological issues affecting the decline of a species. However, to ensure the sustainability of a species three aspects must be considered: biological, economic and sociological. This thesis focuses on a case study of salmon in the Exe catchment comprising three individual studies, and explores the temporal stability of the species across the South West region to assess the status of salmon in other catchments within the region. A panel of microsatellite markers modified from the West Virginia panel was utilised in exploring the population genetics of Atlantic salmon.

Weak population structuring was found within the Exe supported by a number of population genetic statistics. This information was provided to hatchery managers who modified their protocols utilising two strains of fish rather than stocking the catchment with fish from only one tributary. The catchment level estimate of effective population size was consistently reported to be lower than the management target (MT).

A questionnaire distributed to more than 200 anglers suggested that despite a wide variation in opinion the consensus was that as a group they are happy with current management practices but that there are still some changes that could be made, for example, many respondents felt that the some groups involved in decision making regarding salmon management should have a different level of input than they currently have. The majority of anglers were positive about the use of hatcheries as a management tool.

The efficacy of practices at two South West hatcheries (Exe and Tamar) was assessed. Both hatcheries suffered from a decreased level of genetic diversity as a result of the use of a small number of adults and a bias in parental contribution.

Finally, a spatio-temporal analysis of the region suggested that spatial distribution is a dominant force to temporal variation in shaping the population structure of Atlantic salmon in the region. A distinct divide was observed between populations of salmon in the easterly chalkstream rivers (e.g. the Test, Itchen and Frome) and those in the west of the region (e.g. the Exe, Taw and Fowey).

The findings of these studies are discussed in a wider context and support the following recommendations:

1. If a hatchery is to be used on the Exe catchment multiple stocks should be reared to reflect the populations found.
2. Stakeholders, including representatives of angling groups should be involved in conservation and kept up to date with research undertaken and results found.
3. If the Exe and Tamar hatcheries are to be continued, more broodstock should be utilised to improve levels of genetic diversity in the offspring.
4. Effective population size should continue to be monitored at a number of key sites across the region. These sites should be selected following more in depth studies of population structure at a catchment level.

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