BOREAL ENVIRONMENT RESEARCH 3: 421–422
Helsinki 19 January 1999
ISSN 1239-6095

Short communication

Why were the effects of M74 mortality not visible in the spawning run of Baltic salmon in 1997 in the Gulf of Bothnia?

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Ikonen, E. & Torvi, I. 1998. Why were the effects of M74 mortality not visible in the spawning run of Baltic salmon in 1997 in the Gulf of Bothnia? *Boreal Env. Res.* 3: 421–422. ISSN 1239-6095

Fishery

The Baltic salmon fishery exploits salmon during their sea phase and spawning run by catching the fish in offshore areas with drift nets and long lines, and along the coasts with trap nets, respectively. In these fisheries, salmon of both wild and hatchery origin are mostly caught together. When the fish enter a river mouth or a river, the stocks can be harvested separately. On the basis of catch samples from the offshore and coastal fishery, the strength of wild salmon year classes were compared with the volume of the spawning run in rivers, and with the M74 fry mortality in experimental incubation of salmon eggs. The aim of this communication is to explain the reasons for an unexpectedly strong spawning run in 1997 in spite of the negative impact of M74 syndrome causing high yolk-sac fry mortality.

Scale analyses

Scale samples from the Finnish salmon coastal fishery in 1990–1997 were examined in order to find out age distribution as well as the origin of the fish (wild or hatchery). The scale pattern analysis was used to separate wild fish from the reared ones (Antere and Ikonen 1983, Hiilivirta *et al*. 1998). Because the great majority of salmon begin spawning migration after two winters in the sea the smolt age of each two-winter fish (total number 3 313) was established. This way, it was possible to find out the proportions of different year classes in different smolt year classes of fish that had spent two winters in the sea.

What was expected?

The year class 1991 was exceptionally strong. This was verified as high parr densities in a number of Gulf of Bothnia rivers by electrofishing surveys (Anon. 1997). In the northern rivers, the majority of the wild parr smoltify at the age of three. Thus the spawning run in 1996 was expected to be strong because most of the spawning salmon had spent two years in the sea, and with three river years they belong to the 1991 year class. M74-syndrome-related mortality increased rapidly in 1992 which was revealed in electrofishing surveys suggesting that the new year class in the Gulf

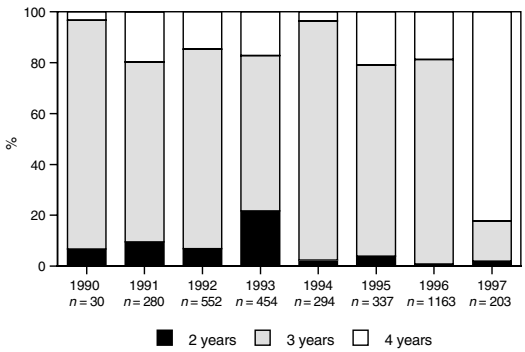

Fig. 1. Distributions of smolt ages of wild two-sea-winter salmon in coastal samples. N = total number of salmon.

of Bothnia rivers was poor. The 0+ parr densities decreased from 1992 onwards to a low level. The spawning run in 1997 arising from the 1992 year class should thus have been relatively poor.

What actually happened?

A smolt run is usually composed of salmon from three successive year classes because the freshwater age of salmon mostly varies from two to four years. In catch samples the proportion of three-year-old smolts in a smolt year class is normally 60%–90% (Fig. 1). However, more than 80% of the two-sea-winter salmon of the smolt year class 1995, caught in 1997, had four freshwater years. This means that this part of the fish belonged to the 1991 year class and the proportion of the 1992 year class (smolt age three years) was lower than 20%. The reason for this exceptional situation was partly the strong year class 1991, and partly the weak year class 1992 caused presumably by M74 mortality. The year class 1991 still predominated in 1997 catches producing a strong spawning run also in 1997. Thus the effect of M74 mortality on the volume of the spawning run did not become apparent in 1997, because the exceptionally strong year class had arisen a year before.

Possibilities to predict the spawning run of wild salmon

The strength of the spawning run of wild salmon can be predicted with various indicators. Parr densities (0+) five to seven years before the run give rough indications of the strength of the year classes on which the run will be based. A bit more exact figure can be obtained from the smolt runs two to four years later. However, post-smolt mortality varies yearly, and this variation will obscure the figure given by the smolt run.

On the basis of the offshore sampling in autumn, the proportions of wild salmon in the age group with one sea winter might be used as a prediction when estimating the strength of the next summer spawning run. If the wild component has remarkably decreased from the level of previous years, a decreased spawning run is to be expected. The changes in the releases of reared salmon must be taken into account. There are no means to decrease M74 mortality or post-smolt mortality. Therefore regular and wide enough sampling during autumn in offshore fishery in the Baltic may give references for needed management measures during the next spawning migration.

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Received 11 June 1998, accepted 24 November 1998