REPRODUCTIVE PRIMING IN MATURE MALE ATLANTIC SALMON (SALMO SALAR L.) PARR EXPOSED TO THE SOUND OF REDD CUTTING

by Andrew Moore* and Colin P. Waring**

Introduction

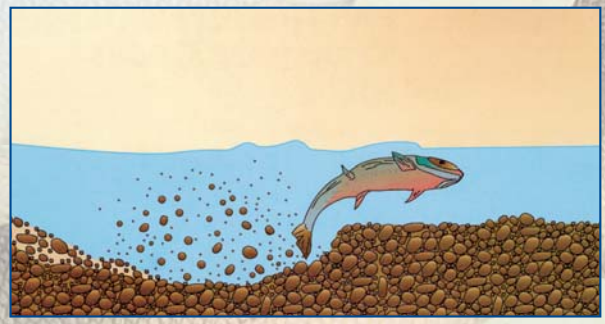
Salmonids are known to use a variety of sensory signals in order to synchronise the reproductive status of the male and female and ensure that spawning success is maximised. Chemical, vibrational and visual cues have all been shown to have either a priming effect on reproductive physiology or have a role in influencing spawning behaviour.

There is also anecdotal evidence that the mechanical disturbance of river gravel may also attract adult male salmon during the spawning season.

There are two possible explanations for this phenomenon:

1. Disturbance of the gravel may release con-specific odours or other attractants
2. The disturbance may be interpreted by the male salmon as a female cutting a redd

The present study examined whether the sound of a female Atlantic salmon cutting a redd could influence the reproductive status of mature male Atlantic salmon parr.



Materials and Methods

Underwater sound recordings were made of a female Atlantic salmon cutting a spawning redd in the River Itchen, southern England. Simultaneously, the behaviour of the female (~65 cm fork length), which was attended by a male (~55 cm fork length), was video-recorded using a Canon EX1 videocamera.

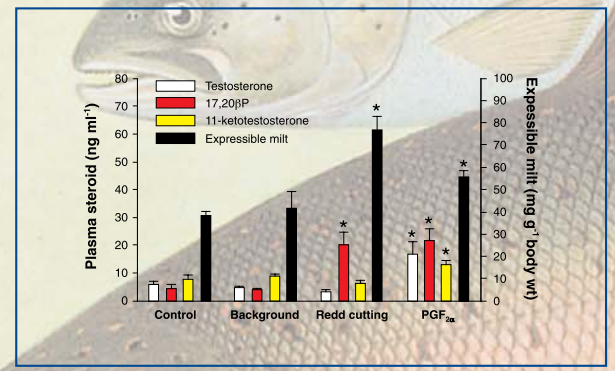


*Figure 1. Mean levels ± S.E.M. of expressible milt and plasma testosterone, 11-ketotestosterone and 17,20β in groups of mature male parr (n=10) exposed to the underwater recordings of redd cutting, background river noise and the priming pheromone $PGF_{2\alpha}$. *P<0.05 compared to control fish*

In the laboratory four groups of mature male salmon parr were exposed to:

1. The sound of redd cutting
2. The background noise when the female was quiescent
3. The priming pheromone Prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$)
4. Control group

Results

- Exposure to $PGF_{2\alpha}$ elevated the levels of expressible milt and plasma levels of 17,20βP, T and 11-KT.
- Exposure to redd cutting elevated the levels of expressible milt and plasma 17,20βP.
- No response to background noise.
- No response in control group.

Discussion

1. Sound production during spawning may have a direct effect on the reproductive status of male fish and ensure synchronisation between the sexes.
2. It is not clear whether the sound produced by the mechanical disturbance of the gravel or the vibrational signals produced by the female during redd cutting elevated the levels of plasma 17,20βP and expressible milt.
3. Further studies are now required to determine the sensory mechanisms involved in the detection of the sound (e.g. lateral line system) and how this modulates and modifies the reproductive endocrine system.

* The Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Lowestoft Laboratory, Pakefield Road, Lowestoft, Suffolk NR33 0HT, UK http://www.cefas.co.uk
** School of Biological Sciences, University of Portsmouth, King Henry I Street, Portsmouth, Hampshire PO1 2DY, UK.

CEFAS
The Centre for Environment, Fisheries & Aquaculture Science