



Impact of an Invasive Non Native Plant in the Dee

Background

Water crowfoot (*Ranunculus* sp.) is an aquatic plant that is native and widespread in England but has only established itself on the River Dee in recent decades. It has flourished in the last decade, demonstrating its invasive quality which is possibly helped by increasing levels of nutrients into the river.

There are concerns that water crowfoot is impacting fish and freshwater pearl mussel (FPM) populations. Water crowfoot reduces stream bed cover for juvenile salmon directly and accumulates sediment which can eliminate suitable substrate for salmon. FPM are highly endangered, a key indicator of environmental health and - like salmon - a designated species in the River Dee's Special Area of Conservation. FPM can be overwhelmed by this plant's rapid growth and sediment accumulation.

Surveys in 2010 showed that water crowfoot currently occurs on the Dee from just above Kincardine O'Neil down to Aberdeen, a distance of over 47 km (29 miles). At the top of its range, plants are found individually or in small clumps, but lower down the plant can cover hundreds of square metres and stretch across the width of the river.



Sediment accumulation in the river bed as a result of the plant's growth can rapidly reduce the usability of gravels for spawning salmon and also increases mortality of salmon eggs and juveniles. A crowfoot control programme was therefore initiated in 2010 which involved removal of the plant from areas of salmon spawning gravel. Water crowfoot removal was done by hand to take out as many rootlets as possible and limit regeneration. All removed material was taken onto dry land to prevent downstream spreading. During the removal work many FPM were found dead in the mats, inundated with sediment accumulated.



The RDT is undertaking monitoring to determine the impact of water crowfoot on juvenile salmon populations and the benefits of the removal work. FPM surveys were also carried out at both sites. Two sites in the River Dee's middle reaches were surveyed, at Lower Dess and Crathes Castle.

At Crathes Castle, water crowfoot has been established for around 10 years and has developed into large, dense vegetation mats covering a significant portion of the river. Surveys at Crathes Castle compared areas with and without the plant.

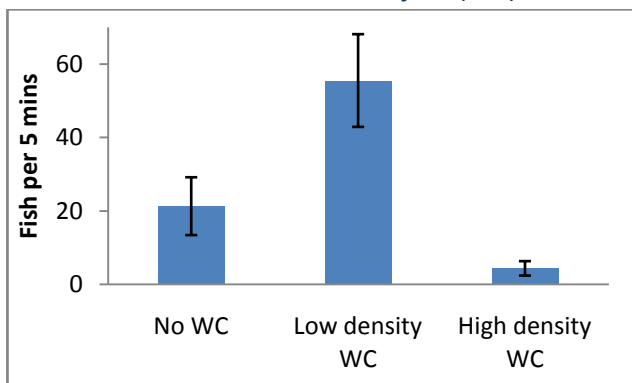


At Lower Dess, water crowfoot is at its current upper limit and is present as clumps. Surveys here established baseline data before water crowfoot removal took place.

Assessment

At Crathes salmon fry densities were greatest where crowfoot density was low (scattered individual plants). In contrast, areas with dense vegetative growth had significantly reduced salmon fry, approximately 20% of the numbers found in areas without crowfoot. Low densities of salmon fry were also found in areas of dense growth at Lower Dess.

Abundance of salmon fry at Crathes in areas with and without water crowfoot (WC)



Many dead FPM were found during the crowfoot removal programme, clogged with sediment amongst the mats. Those measured showed that FPM of all sizes and ages were affected.

Conclusions

The presence of water crowfoot has a significant impact on salmon fry. When present as low numbers of dispersed plants it is associated with greater numbers of salmon fry, perhaps because of the increased cover it provides. In contrast, dense

growths of large plants appear to be highly detrimental as they are associated with greatly reduced salmon fry populations. Numbers of aquatic invertebrates found on crowfoot also appear low, suggesting that there is no boost to food supplies for juvenile salmon.

Salmon parr were caught in very low numbers in vegetation and suggests that even low densities of crowfoot will not boost overall smolt production.



Water crowfoot appears to reduce habitat for juvenile salmon. It is thought that this is due to accumulation of fine sediment by the vegetation, which covers juvenile salmon habitat. FPM also seems to be seriously impacted, possibly through inundation with fine sediments.

The evidence suggests that removing dense water crowfoot growth will help salmon and freshwater pearl mussels. It is invasive, colonising new areas quickly and has no natural control mechanisms on the Dee. Removal is a labour intensive operation. The RDT and Dee DSFB will continue with its removal programme. However, to be effective, it needs to be a multi-organisation co-operative approach; the RDT is currently pursuing this.

This is one of a series of bulletins that highlights some of the RDT's work in restoration and monitoring. No. 007

Company Limited by Guarantee Registered in Scotland - Reg No SC190764 - Registered Charity No SCO28497

River Office, Mill of Dinnet, Dinnet, Aboyne, Aberdeenshire, AB34 5LA

Tel: 013398 80411

e-mail: info@riverdee.org

web: www.riverdee.org