



Association of Salmon Fishery Boards

Beaver Introduction in Scotland

June 2012

Introduction

The Association of Salmon Fishery Boards is the representative body for Scotland's 41 District Salmon Fishery Boards (DSFBs) including the River Tweed Commission (RTC), which have a statutory responsibility to protect and improve salmon and sea trout fisheries. The Association and Boards work to create the environment in which sustainable fisheries for salmon and sea trout can be enjoyed. Conservation of fish stocks, and the habitats on which they depend, is essential and many DSFB's operate riparian habitat enhancement schemes and have voluntarily adopted 'catch and release' practices, which in some cases are made mandatory by the introduction of Salmon Conservation Regulations. ASFB creates policies that seek where possible to protect wider biodiversity and our environment as well as enhancing the economic benefits for our rural economy that result from angling. An analysis completed in 2004 demonstrated that freshwater angling in Scotland results in the Scottish economy producing over £100 million worth of annual output, which supports around 2,800 jobs and generates nearly £50million in wages and self-employment into Scottish households, most of which are in rural areas.

Background

The European Beaver (*Castor fiber* L.) was once widespread across the northern forest belt of Europe and Asia. However, hunting and trapping for fur, food and castoreum (used in medicines and as a fixative for perfumes), coupled with habitat loss due to intensive management for agriculture purposes resulted in a dramatic decline in numbers. Although not totally exterminated, only small residual populations remained by the 19th century. To reverse the effects of this over exploitation, beavers from these residual populations were used for re-introduction programmes in Sweden, Norway, France, Germany, the Netherlands, Poland, Switzerland, Austria, Finland, Latvia, Estonia, Lithuania and Russia. In some of these countries the populations now have an extensive distribution and beavers are harvested both as a natural resource and to control damage.

Article 22(a) of the EU Habitats Directive requires member states to assess the desirability of reintroducing species listed on Annex IV (including the European Beaver) to areas where they were once native, to contribute to the re-establishment of these species at favourable conservation status.

There are a number of peer-reviewed scientific papers relating to the potential effects of beavers on fish populations and fisheries. We do not intend to reproduce this information here, but we would highlight, in particular, the reviews by Collen (1997)¹ and Kemp et al. (2010)² which were commissioned by SNH. These reviews have summarised a number of potential conflicts and benefits to fish and fisheries. However, it is apparent that there is very little direct information on the effects of European beaver on any freshwater fish species.

Potential Benefits/Conflicts

Some authors have made the point that beavers would be unlikely to pose a threat to Scottish freshwater fisheries as trout, salmon and beavers evolved together over millions of years. However, Collen (1997) highlighted that when these species coexisted in Scotland, the habitat and land use activities would have been different to those occurring now. In addition, he stated that there is no information as to what the

¹ Collen, P. (1997) Review of the potential impacts of re-introducing Eurasian beaver *Castor fiber* L. on the ecology and movement of native fishes, and the likely implications for current angling practices in Scotland. SNH Review No 86.

² Kemp, P.S., Worthington, T.A. & Langford, T.E.L. 2010. A critical review of the effects of beavers upon fish and fish stocks. SNH Commissioned Report No 349 (iBids No. 8770).

population levels of beaver were at that time and current pressures such as over-fishing, fish farming, habitat degradation and a variety of pollutants, were not affecting salmon in the past when beaver were present. Therefore although we can assume that these species did occur together in watercourses in Scotland it is more difficult to comment on the outcome of this coexistence. For example, it is possible that in the past salmon and trout were limited to larger channels, and the extinction of beavers allowed salmonids to utilise a wider range of habitats. This may have allowed increased variation within the salmonid population, potentially leading to a wider range of run timings as fish occupied higher altitude and smaller channels made available by the absence of beaver dams.

It has been suggested that Beavers may provide a number of potential benefits and conflicts with regard to fish and fisheries. Potential benefits include: provision of refugia from low flow by beaver ponds; increase in woody debris resulting from tree felling, leading to increased invertebrate density and biomass; beaver ponds may provide juvenile rearing habitat³; beaver dams may reduce siltation of spawning gravels below the impoundment. Potential conflicts include: disruption to upstream and downstream migration of fish; increased predation/poaching on those fish impeded by barriers; increase in siltation upstream of the barrier; changes in water temperature which may be suboptimal for salmonids which may also result from the reduction of riparian vegetation which provides shade.

Of these potential conflicts, the most important issue from a wild fisheries perspective is the potential disruption to upstream and downstream migration of fish. Collen (1997) stated that Eurasian beavers are certainly capable of building dams large enough to impede the movement of fish if they are constructed in certain locations. He concluded that, in Scotland, the appearance of any dams with the potential to affect fish migration would have to be investigated. This could be studied elsewhere in Europe by examining the distribution of both beaver dams and juvenile salmonids. This would allow the assessment of whether salmonid numbers were typically reduced upstream of Beaver dams or were at the same levels as downstream.

Management

A key issue for fisheries interests in the long-running debate on beaver introductions has been the need for an effective management programme. Experience from reintroductions in Europe has shown that conflicts often do not become apparent for many years following reintroduction. For example, Kesminas *et al.* (2006)⁴ now list "Beaver activities" as a threat to Sea-trout stocks in four out of the ten sea trout rivers of Lithuania some fifty years after their re-introduction. Kemp *et al.* (2010) made clear that , long-term strategies for control of European beaver populations should be considered if a full reintroduction is sanctioned, in light of European obligations (and potentially public opinion) that may limit direct action being taken. Lessons should be learned from experience obtained in Massachusetts where increases in North American beaver populations have resulted in human-beaver conflict and negative public opinion⁵. Kemp *et al.* (2010) also highlighted the experience in North America which has suggested a number of potential management strategies in relation to beaver dams. However, quantification of porosity of such barriers to fish movement beyond pure speculation can often prove difficult without expensive investigation (e.g. radio telemetry studies), and in the case of dismantled beaver dams, it is likely that they

³ However, this appears not to be the case for juvenile salmonids. Indeed, the conversion of shallow, fast-flowing water to slower, deeper water by Beaver ponds reduces the amount of habitat for juvenile salmonids and increases that for non-native, slower-water species such as Minnow (*Phoxinus phoxinus*) and Pike (*Esox Lucius*) (Hagglund & Sjöberg, Forest Ecology and Management, Vol 115, Issues 2-3, 1999). Recently, predatory non-native pike have become widespread in lochs throughout Scotland. In reservoirs, lochs and slow flowing rivers they can be major predators of smolts but they cannot survive in faster flowing streams; however, beaver ponds will provide ideal habitat for them and it is to be expected that where pike exist in lochs in upland areas, they will be able to lodge in beaver ponds downstream. Under these circumstances, smolts migrating downstream will have to negotiate a series of predator-occupied ponds and in low-flow conditions the cumulative effect on the runs may be substantial.

⁴ Kesminas *et al.* 2006: Lithuania country report to the Baltic Sea-trout Workshop, Kotka, Finland.

⁵ Jonker *et al.* (2006) Wildlife Society Bulletin 34(4): 1009-1021.

will be rebuilt relatively rapidly. Management measures have obvious cost implications, and the responsibility for funding mitigation action is likely to result in some debate.

Collen (1997) summarised the situation as follows: *'In Scotland, beaver would have no major predators, they would be capable of travelling within and between catchments, and they would be able to alter the environment to suit their own needs. Such alterations could be harmful or beneficial to fish populations and it would be difficult to generalise as each case would have to be assessed individually. Thus beaver reintroduced to Scotland would require a policy of active management. It is concluded that, following any successful reintroduction, there would eventually be areas of conflict with fisheries interests. The time taken to reach this situation and the seriousness of the problems would depend ultimately on the effectiveness of the beaver management programme. Fisheries authorities would be unlikely to support the re-introduction of this mammal unless they were presented with such a programme.'* He concluded that, as a priority, a comprehensive, ecologically sound beaver management plan should be produced before any re-introduction is attempted.

It is worth stating that all of the countries in which beaver introduction has resulted in major wild populations have had stronger hunting cultures than Scotland has and beaver populations are at least partly controlled through hunting. In Scotland, however, it is unlikely that Beaver will be hunted or trapped and therefore lessons must be learned from the experience in Massachusetts, where failure to control populations resulted in human-beaver conflict and negative public opinion. This cultural difference between Scotland and other countries has to be borne in mind when considering the impacts of Beaver on salmonids and the subsequent management that will be necessary.

Beavers in Scotland

Knapdale Trial

In May 2008, the Scottish Government gave permission to the Royal Zoological Society of Scotland and the Scottish Wildlife Trust for a scientifically monitored trial reintroduction of European beavers to Knapdale Forest in mid-Argyll. The Scottish Government placed some conditions on the trial, including the need for the monitoring to be done independently, and coordinated by Scottish Natural Heritage.

In 2009, beavers were released at Knapdale. A programme of monitoring is now underway, run by SNH in collaboration with a range of independent monitoring partners including a number of academic institutions and the Argyll Fisheries Trust. The monitoring will run for five years from the May 2009 release, with a further year at the end to allow final reports to be produced and submitted to government. Finally, the Scottish Government will decide on the future for beaver reintroduction to Scotland.

The criteria for success/failure of the trial were covered in the application by RZSS to Scottish Government for a license.

Criteria for success:

- Survival of introduced animals is similar to successful re-introduction programmes elsewhere in Europe at similar period of population establishment.
- A stable or increasing core population is achieved within the limits of the study site.
- The beaver population demonstrates a positive contribution to ecosystem function.
- Beaver re-introduction is integrated with habitat management/restoration.
- The impact on the economy of the area as a result of the presence of beavers is positive.

Criteria for failure:

- Mortality levels preclude establishment of a population.
- Significant and unsustainable damage is incurred by the ecosystem within the study site.
- The area suffers significant economic loss as a result of beaver activities.
- Costs of project/damage/management significantly exceed expectations.

Beaver Salmon Working Group

As highlighted above, there remain a number of concerns relating to the interactions between beavers and freshwater fish and fisheries. However, due to the absence of migratory salmonids, the Knapdale trial will be unable to inform how beavers and migratory fish may interact and the criteria for success/failure for the trial do not take these concerns into account. In light of these concerns, the Beaver-Salmonid Working Group was set up to consider the issues surrounding beavers and migratory fish. The Beaver-Salmonid Working Group is chaired by Professor Roger Wheater. The membership of the group comprises ASFB, Marine Scotland, National Museums of Scotland, Scottish Government and Scottish Natural Heritage. Its terms of reference are:

- To arrange for further, ongoing review of new beaver - salmonid information from Eurasia and North America;
- To examine the availability of potential beaver habitat that overlaps some Scottish salmonid catchments;
- To examine the issue of beaver presence on particular Scottish catchments and whole ecosystems, in relation to possible interactions with salmonid populations;
- To examine the specific issue of possible beaver dam presence on Scottish rivers in relation to possible interaction with salmonid populations;
- To examine potential management issues, methods and options in relation to beavers and salmonids;
- To examine options for field based assessments of beaver and salmonid interactions in Scotland.

Tayside releases

In Tayside, a number of beavers have either escaped or been deliberately released into the wild, an offence under the Wildlife and Countryside Act. SNH estimate there are about 100 beavers living in the wild in the Tay catchment. Despite concern at the potential for an important and unwelcome precedent to be set, in March 2012 the Environment Minister, Stewart Stevenson announced that these animals would not be removed and instead would be monitored until the end of the Knapdale beaver trial in 2015, when a decision will be made about the future re-introduction of beavers to Scotland as a whole. Given the illegal nature of the Tayside introduction, the fact that it can never be considered to have met the IUCN guidelines on species reintroductions and the lack of assessment of the disease or genetic status of these animals ASFB were opposed to this course of action.

A new working group, to be chaired by SNH and including the Tay District Salmon Fishery Board, will gather information and monitor impacts on other wildlife and land use. This information will help inform the eventual decision-making and develop further our knowledge and understanding of managing beavers. The group will also provide advice and practical help in relation to managing beavers to landowners in the area.

ASFB Policy Position

District Salmon Fishery Boards and Fishery Trusts have spent a great deal of time, money and effort removing barriers and planting riparian trees. Indeed, a recent survey by ASFB and RAFTS has demonstrated that, over the last 10 years, 97 barriers have been removed resulting in an estimated 2186 km of newly accessible river habitat. Whilst no data was collected on the number of trees planted, it is estimated that 1020km of riparian habitat has been restored or enhanced. It is perhaps unsurprising therefore that the reintroduction of an animal which creates barriers and removes riparian trees is viewed with a great deal of unease by wild fisheries interests.

ASFB support the Knapdale beaver trial, which is being conducted on a legal, licensed, scientific basis with appropriate monitoring. However, we also recognise the limitations in such a trial as the lack of migratory salmonids in the area mean that the Knapdale trial will be unable to inform how beavers and migratory fish may interact. In addition, experience from other European reintroductions has demonstrated that the timescale over which negative interactions might be expected may run into decades and therefore the relatively short duration of the trial would not pick up many of the expected effects. Beavers only build dams

where the habitat is not immediately usable by them, their full effects on catchments cannot be assessed until population levels force them into sub-prime areas. Accordingly, we do not believe that the criteria for success/failure of the Knapdale trial are adequate to assess the effects of beavers on wild salmonids. ASFB remains an active member of the Beaver Salmonid Working group which aims to model some of the potential interactions between beaver and salmonid habitat.

ASFB believes that the decision not to remove the illegally introduced animals on Tayside risks setting a dangerous precedent for the illegal introduction of more beavers of uncertain origin, or indeed other species. There is widespread agreement that an active management plan is vital for a species that would be capable of spreading within and between catchments and which has no major predators in Scotland. If the illegally introduced population in Tayside cannot be removed, it is difficult for wild fisheries interests to accept any assurance that beavers introduced through a managed reintroduction programme can be managed in future, should the need arise.

If we assume that assurances relating to management could be provided (and were to be acted on by future governments), we would seek clear evidence that appropriate derogations under the Habitats Directive for the management of populations and the removal of dams could be undertaken where necessary. Of particular importance would be confirmation that the burden of evidence for dam removal does not prevent such derogations being deployed where there are serious time constraints (e.g. a barrier potentially preventing a smolt run reaching the sea) or in other emergency situations⁶. This is especially important, as such work may also require CAR authorisation from SEPA to undertake associated river works. Central to this issue would be the identification of the body responsible for bearing the potentially significant cost of undertaking such management action. In the absence of such assurances, ASFB has adopted a formal policy in opposition to the reintroduction of beavers in Scotland.

ASFB have been assured by the Scottish Government that the Wildlife and Natural Environment (Scotland) Act 2011 contains the necessary powers for Scottish Ministers to provide guidance on how non-native animals should be kept in captivity. We believe that these powers should be used, at the earliest opportunity to ensure that all captive beavers in private collections are adequately chipped, tested for disease and securely enclosed as a condition of ownership.

Conclusions

- Scottish Ministers should use their powers under the Wildlife and Natural Environment (Scotland) Act 2011 at the earliest opportunity to ensure that all captive beavers in private collections are adequately chipped, tested for disease and securely enclosed as a condition of ownership.
- The criteria for the assessment of success/failure of the Knapdale trial (as set out by RZSS) should be reassessed to place the wider environmental impact of beavers, and the likely timescale of such impacts, into their proper context. An alternative approach would be to gather information appropriate to Scotland from catchments in Europe containing both salmonids and mature European beaver populations.
- ASFB has adopted a formal policy in opposition to the reintroduction of beavers in Scotland until such time as clear, unambiguous assurances, consistent with the requirements of the Habitats Directive, can be given relating to the management of beaver populations and the removal of dams.

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⁶ An example of such a case was in Estonia, where drought in 2002-3 dried up half the length of the river Esna (a noted trout river) forcing fish to migrate downstream where they got trapped behind the beaver dams and died. Once the drought was over, recolonisation upstream was also prevented by the most downstream of the beaver dams (Tambets *et al.* 2005. *Journal of Fish Biology*, 67 (Supplement B) 275-276.)