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Policy statement on stocking of Atlantic salmon in Scotland

“RAFTS policy is that there is a general presumption against stocking of salmon for fishery enhancement purposes.

A comprehensive body of scientific evidence, both national and international, confirms that enhancement stocking is largely ineffective and potentially harmful.

Alternative strategies such as stock conservation and habitat enhancement are likely to provide more effective, cost-efficient and sustainable solutions.”

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1. Introduction and background

RAFTS represent the network of 25 charitable fishery trusts in Scotland. As a fundamental principle, the trusts operate from a basis of evidence-based management, and from this foundation seek to influence sustainable management practice of Scotland’s freshwater habitats, their native fish populations and associated fisheries. Allied to this remit is a wider interest in native freshwater ecology and habitat in view of the interdependent nature of aquatic ecosystems.

As long ago as 1991, the Salmon Advisory Committee published a short report ‘Assessment of Stocking as a Salmon Management Strategy’. The general principles of assessing the effectiveness of stocking have not changed since that report, and it provides clear guidance on the likely and realistic outcome of most hatchery operations in the UK. More recent advice is contained in the Fisheries Research Services Scottish Fisheries Information Pamphlet No 22 2003 ‘Salmon and Sea Trout - to stock or not’ (see [HERE](#)).

Through genetic analysis a better understanding of the population structures and genetic differences of Atlantic salmon which exist within and between rivers, and which should be protected, can now be gained. Initial studies across Scotland have begun to investigate these populations and can be viewed [HERE](#). In addition the actual contribution to the rod catch of a river can be estimated using genetic techniques and by sampling the rod catch, recording hatchery crossing information and retaining brood stock samples. A study of this type on the Spey demonstrates that the hatchery made an annual contribution to the rod catch of between 0 - 1.8% in any given year.

It is worth recognising that hatcheries do not produce ‘additional’ eggs – adult fish have to be removed from the wild to generate juveniles, these fish would have spawned in any case and so any returning adult fish are not fully additional to the catch.

This policy statement is not a comprehensive and prescriptive guidance document on stocking. It simply sets out RAFTS members’ policy on artificial restocking of salmon, which RAFTS, and its member trusts, are signatories to. Many of the principles in this policy may refer equally to sea trout – however, due to the complexity of the relationship between migratory and non-migratory trout, this can be less straightforward, and most authorities would caution against any stocking of sea trout as there are a number of risks which may damage the stock. More knowledge on the biology of sea trout is needed before successful stocking strategies can be considered.

2. Principal policy statement

Any proposed stocking programme should undergo a process of evaluation to firstly ascertain whether stocking is required, then if so, what type of stocking programme would be most suitable and then the cost, benefit and risks associated with that programme of action. If the site is already at carrying capacity then additional stocking will have little or no benefit and is likely to be detrimental. Carrying capacity of individual areas will depend on a number of factors, including habitat quality, water quality, productivity and altitude. Inappropriate stocking in areas wrongly identified to be below carrying capacity can be extremely damaging to the wild salmon already present, both in terms of removing wild adult fish to collect eggs and reduced fitness of the hatchery juveniles produced.

3. Types of stocking and specific position statements

Stocking can be separated into three main disciplines – Enhancement, Mitigation and Restoration. Definitions are as follows, with the relevant policy positions stated:

Enhancement stocking is defined as “artificial production in excess of natural production with the aim of increasing population size above existing carrying capacity to allow for increased harvest.”

RAFTS policy is that there is a general presumption against stocking of salmon for fishery enhancement purposes. Enhancement stocking is carried out to supplement an existing stock where natural production is believed to be sub-optimal, but the reason for this cannot be identified and has not been formally assessed. Enhancement can also mean situations where the aim of the stocking is to deliberately increase fish production well above any existing natural level.

A growing and significant amount of evidence now demonstrates that the efficacy of salmon stocking in the majority of circumstances in Scotland (mainly for ‘enhancement’ of existing stocks) is at best largely ineffective, and at worst, can have a damaging effect on existing native populations, through removal of wild brood-stock, displacement of existing populations and reduced fitness and reproductive success of any progeny. Key impacts include removal of fish which would otherwise have spawned naturally, restocking eggs and fry in places where the adults would not have naturally spawned, and issues associated with the mixing up of different fish from different parts of a system which can dilute or change natural population structures.

Mitigation stocking is defined as “stocking that is conducted to mitigate against lost production due to a man-made scheme or activity that cannot be prevented or removed”. It is important to note that mitigation stocking is undertaken in response to man-made impacts, where scope for natural spawning or completion of the freshwater phase of the life cycle has been artificially removed or is not possible and restocking is to act as compensation for lost spawning habitat or reproductive potential or opportunity.

Stocking for mitigation purposes is carried out to replace clearly identified lost production due to an activity or 'bottleneck' that cannot be removed. A good example is habitat lost due to hydro-power dams. RAFTS believe that mitigation stocking is potentially appropriate and effective, but only in the right circumstances, at the correct scale and applied in a sustainable way. A professional evaluation of the limiting factors to fish production should always be undertaken by an appropriate organisation before a proposal for stocking is made to the relevant consenting body (see 5. the regulatory authorities).

Restoration stocking is defined as "stocking which is carried out after the removal of the factor(s) that has been limiting or preventing natural production."

Stocking which is carried out after the removal of a factor which has been limiting or preventing natural production may also be termed 'restoration'. This may be appropriate, for example, where a stock of fish has been exterminated as a result of chronic pollution, or access to spawning areas have been prevented by a physical barrier. However, stocking is normally only appropriate to restore the population if natural recolonisation will not occur, for example where a population is extinct. If there is a residual, native population, then it is always best to let natural reproduction and recolonisation take place. In either case, the cause of the problem can be removed and stocking may be appropriate as part of a strategy to restore the population to optimal size. However, it should be realised that it is only time that might be gained by such stocking – once an obstacle, for instance, is removed, there is good evidence gleaned from past examples that salmon will recolonise upstream naturally. Artificial stocking can impede this and ultimately reduce the productivity of the newly accessible water.

4. Evaluation of the problem

Before contemplating any stocking action, a careful assessment of the limiting factors to fish production should be identified. Only by doing this, will it be possible to tackle the root cause of the problem. Stocking may, or may not be an appropriate and effective tool. It is essential that fishery managers evaluate local circumstances and apply this policy advice locally.

5. The regulatory authorities

Any proposal to remove fish from the wild environment for the purposes of artificial rearing and subsequent stocking must, by law, be carefully assessed by regulating authorities (DSFBs and Marine Scotland¹).

In addition, Scottish Natural Heritage (SNH) have an interest in sites designated as Special Areas of Conservation (SAC) for Atlantic salmon and for other species where the stocking activity may be considered relevant to the designation for these species. It is important to note that DSFBs, in these areas, are regarded as 'competent authorities' under the Habitats Directive – this places specific legal obligations upon them, including the need to undertake specific assessments on whether a stocking action may have a significant effect on the integrity of the site. More information is provided on this in 6. below.

Furthermore, the Wildlife and Countryside Act 1981 has provisions making it illegal to introduce and species beyond its natural range. In the case of Atlantic salmon this may be considered by SNH to include the stocking of fish above natural barriers to migration and advice should be sought in this regard.

It is incumbent upon these bodies that due diligence is undertaken to ensure the legislation on brood-stock capture is fully complied with and that any potential impact on wild fish are considered. In particular, parties seeking consent to collect wild brood-stock, rear those progeny and release them into a river system must:

- Specify the origin of the fish from which stock will be taken;

¹ Section 33A of the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003

- Where those fish will subsequently be released and at what life stage;
- Provide evidence to support the need for artificial intervention and demonstrate that the stock and carrying capacity is sub optimal. This should include evaluation of any negative effects on existing wild fish populations;
- Provide an evidence base to clearly state anticipated outcomes from the programme;
- Provide a description as to how the effectiveness of the action will be monitored;
- Taking account of brood-stock removal, demonstrate that sufficient numbers of adult fish are left to support natural production from that area;
- Record mortalities (including loss of adult brood-stock, and ova and fry from hatchery);
- Report on the outcome – what was the measured effect by monitoring the outcome?

The two principal regulating authorities for stocking in Scotland – Marine Scotland and the DSFBs – should have robust, transparent and clearly understood risk assessment and evaluation procedures in place for proposals for stocking which come within their respective jurisdictions. This should include a clear protocol for considering applications and proposals, an auditable record of discussions leading to decisions and a record of consents granted and refused, including the rationale for each decision.

In addition to their legal function of regulating introductions of freshwater fish (and salmon where there is no DSFB), Marine Scotland are the consenting national authority for the capture of wild salmon for brood-stock purposes during the annual close time by methods other than rod and line. (The annual close time includes the ‘extension’ for rod angling). This is the first critical stage in the process of artificial propagation and Marine Scotland should ensure that there is satisfactory scientific justification should it decide to authorise the collection of brood-stock at this early stage in the process.

By definition, if Marine Scotland authorises the removal of wild salmon brood-stock for hatchery propagation, it is effectively endorsing the storage of these fish and progeny for future reintroduction, so it is a critical and fundamental link in the chain of consent. However, removal of adult broodstock and stocking of juveniles are independent and separate licensable activities undertaken by two distinct authorities - Marine Scotland regulate the taking of brood-stock and DSFBs regulate the introduction of the resulting progeny. Whilst there should be clear and logical co-ordination between both consenting authorities, it is important to recognise that the granting of one consent should not automatically mean the other consent is granted. Of paramount importance is the need for record-keeping which relate to consents – all decisions should be supported by clear trail of evidence.

Scottish Natural Heritage should also be consulted in respect of any proposed stocking activity in an SAC (see section 6 below) and in respect of interpretation of the Wildlife and Countryside Act 1981.

6. SACs – key legal obligations

In Scotland, there are 17 Special Areas of Conservation (SACs) designated under the EU Habitats Directive which have Atlantic salmon as the qualifying species. These sites have added legal protection and any stocking programme is likely to be considered as a ‘plan or project’ by SNH and so require the completion of an appropriate assessment to allow the activity to be considered in the light of the SAC designation and any impact upon the either the qualifying species or the conservation objectives of the site. The significance of ‘plans or projects’ in relation to SACs is high and broodstock collection and stocking will always trigger a consent process, which will determine if the proposal is necessary for the conservation management of the site, and if not, whether it is likely to have a ‘significant effect’ on the site. Specifically, consenting authorities (DSFBs and Scottish Ministers) should undertake a formal ‘appropriate assessment’ of broodstock removal and the effect of stocking in the site.

Scottish Natural Heritage has produced a guidance leaflet to outline the procedural steps relating to 'plans or projects' in European sites, this includes a flowchart to describe the steps involved. A copy of the guidance can be viewed [HERE](#)

Although the SACs designated for Atlantic salmon are of most relevance, there are catchments, or parts of catchments, designated as SACs for other species e.g. otter, lamprey, freshwater pearl mussel and ranunculus, and where this is the case the stocking activity may still require the preparation of an appropriate assessment to allow consideration of the activity in respect of the species associated with the designation.

7. Alternative strategies

Alternative strategies to improve stocks can include removal of physical barriers to fish migration, habitat improvement and reduced human exploitation. Catch and release (C&R) can be an important supporting strategy to these actions, particularly where a stock component is especially at risk or fragile. This has a significant benefit insofar as the fish will deposit eggs where it is genetically predisposed to do so in the river system. A range of studies show that angler exploitation on early-run fish can be high, and up to 40%². Given that these are currently the most fragile stock components, C&R can have significant effect in protecting this element of the overall Atlantic salmon stock.

Considering a contemporary example, spring fish are predominantly female and often large, so in a situation where 200 spring fish are killed in a river, the net loss of eggs to the river could be as high as 1 million; eggs of proven spring stock and more genuine spring eggs than most Scottish hatcheries have ever reared. This should be compared to the significant costs associated with artificial production of eggs in a hatchery, where the artificial selection of adult fish for brood-stock will reduce overall success and where the wild survival of reared progeny will be lower than naturally spawned fish. Research has shown that reduced fitness in juveniles can be carried over to subsequent populations.

Moreover, significant costs associated with the operation of a hatchery are avoided, the fish will spawn in the correct location and overall survival rates are likely to be higher than those achieved by hatchery reared fish. This demonstrates, at a time when particular stock components are fragile, there can be a significant amount of eggs removed from the river.

It should be noted that funds, manpower and other resources put into a hatchery operation may limit the effort that can be put into habitat restoration and barrier removal. Capital expenditure on these habitat improvements will result in sustainable improvement. Hatcheries become an annual revenue spend which, in the long-term, is not sustainable.

RAFTS, March 2014

² Davidson, I.C., Cove, R.J., Milner, N.J. and Purvis, W.K (1996) Estimation of Atlantic salmon (*Salmo salar* L.) and sea trout (*Salmo trutta* L.) run size and angling exploitation on the Welsh Dee using mark-recapture and trap indices. In Stock Assessment in Inland Fisheries (Cowx, I.G Ed.). Fishing news Books, Blackwell Science, Oxford, 293-307