

Hatcheries; causing conflict and resolving conflict at the same time!

Dr David Summers

Fisheries Director

Tay Foundation / Tay DSFB

Salmon hatcheries

- Causes of conflict
- How might we help resolve them?

Evidence of conflict

- “On the River Dee in Scotland, however, hatcheries have been closed... This seems a mistaken policy...” Richard Donkin (FT angling correspondent) October 2008.
- “I know that a growing number of fishermen and boatmen are concerned at the lack of serious debate about a restocking policy [on the Tweed]”. Richard Vainer, *Trout & Salmon* letters September 2009.
- “If, as appears to be the case, the stocking of fry is carried out by the [Spey] fishery board merely as a sop to those anglers in favour of hatcheries – and with no real prospect of making a difference – then it is nothing more than a sham...” Richard Inglis, *Trout & Salmon* letters March 2010.
- “Wake up, Tay Board! The evidence is clear – your eyed-ova policy is not working....If this were a results-based business your backers would justifiably be foreclosing on you” Graham Salisbury, *Trout & Salmon* letters December 2009.

Nature of the conflict

- Complaints if you don't have one
- Or complaints that most successful methods not being employed.

Why do these beliefs exist?

- On some rivers catches are not apparently responding to hatchery work.
- Where there is no hatchery, it is often felt catches could be better
- Set in a background of some examples where hatchery use has coincided with improvements. These tend to get well publicised.

Are some hatchery techniques better than others?



Hatcheries – what are they meant to achieve?

- To increase smolt output and hence returning adult numbers by improving survival of egg to smolt compared to the wild.
- Different options may be used according to where the natural survival “bottlenecks” may be considered to be, e.g. eyed ova, unfed fry, fed fry, parr or smolts.

How well do hatcheries work?

- Smolts
- Fed on fry / parr
- Eyed ova / unfed fry

Smolts

- More information than fry or parr because they can be more readily tagged.
- General finding is that on rearing from broodstock sourced in the wild, survival is poorer than wild smolts - about 10% of whatever wild smolt survival happens to be. Typical return to the rod < 1 - 3 per 1000.
- But because in the wild, egg to smolt survival is around 1%, there is still scope for improving lifetime survival.
- Numbers needed to make significant impact are large

Fed on fry / parr

- Spey DSFB, Spey Dam. Survival from stocking to smolt varies from 0.5% to 2.9%. Higher survivals associated with low stocking densities.
- Polson, Cally Burn, Spey. Autumn parr gave around 3% to 4% survival to smolting. Survival highest at low density. Stocking at 0.5 parr per sq. metre most successful. Parr did not disperse much from stocking locations.
- Aprahamian, fed fry, NW England. Survival around 5% to 18 months.
- Kielder. Data sparse, but seems to be in same ball park.
- Tweed stocking of Kielder reared parr, 1980s. About 1 in 3000 return to the rod, say about 3% survival to smolt?

Survival of eyed ova or unfed fry to smolt

- River Bran (Conon), eyed ova to smolt, just under 2%.
- Grudie Burn (Shin), unfed fry to smolt, around 1.5%, despite stocking where parr are present.
- Polson. Fraction of 1%. One tenth of fed parr.

Are Polson's findings representative?

- Polson – Survival of unfed fry to first autumn was only about 1 or 2% (density around 0.1 per sq. metre).
- DAFS, Tummel streams, early 80s. 15% to 26%.
- DAFS, Fender Burn, 1970s. 31%.
- DAFS, Lui, 1989. 52% in after 4 months, 8% after 16 months.
- TDSFB, Innerwick Burn 2001, 19% to 25%. Braan, 2000. 8%

Other relevant studies

- Stewart (1998) Compared unfed and fed fry in Tay tributaries above waterfalls. Results varied. In some cases unfed were better. Conclusion equivocal.
- Middle Dee Group. Fed on fish stopped growing once released. Significant mortality during rearing process except where rearing densities were low. Feeding on was terminated as a result.

Are Polson's findings representative?

- As regards unfed fry, or indeed wild production, **PROBABLY NOT!**

To feed or not to feed...

- Survival to smolting of about 2 to 5% may be possible by feeding if stocked in appropriate location.
- Unfed, if incubated well, at worst, no more than slightly poorer than fed (but may be further in-hatchery mortality of fed on fish).
- Survival of both is dependent on stocking density. (Dispersing hundreds of thousands of parr at 0.5 per sq. metre is quite an issue!)
- Effective dispersal may be a more important consideration than stage stocked

Weakness of stocking

- Fact that hatcheries can work means natural production is also efficient at low stocks.
- Girnock Burn. Egg – smolt (including autumn parr migrants) survival is around 2% or even greater at point of inflection on S – R curve.
- So, in some rivers at least, there may be no advantage in removing fish to a hatchery when stocks are low.
- This also means that most rivers, on the east coast at least, still have a large natural smolt production despite current poor marine survival.
- This means that where the main problem is at sea it's not a question of “restocking” as most imagine, but supplementing the considerable population already there.
- The challenge is therefore one of scale.

Weakness continued...

- Most hatchery operations are too small relative to natural production to make a big difference.
- Hatchery work tends to be constrained by practical difficulties, e.g. obtaining broodstock. So for this reason hatcheries tend to have a ceiling size, 100s of 1000s to a few million, the size probably in a similar proportion according to the run of the river.
- If its easy to get broodstock then a hatchery maybe will make little difference overall but if you cant get broodstock, that's probably when it could work!

Does the conflict have a real basis?

- It is not clear that it has.
- Been a few well publicised examples where hatchery work has coincided with improvement in salmon numbers. In all cases have been on rivers where the natural population was wiped out and conditions have changed to allow some recovery. E.g. the Tyne.
- But the widely accepted beliefs might not necessarily reflect reality.
- For example, on the Tyne the Environment Agency accepts the role of hatchery is now very small.

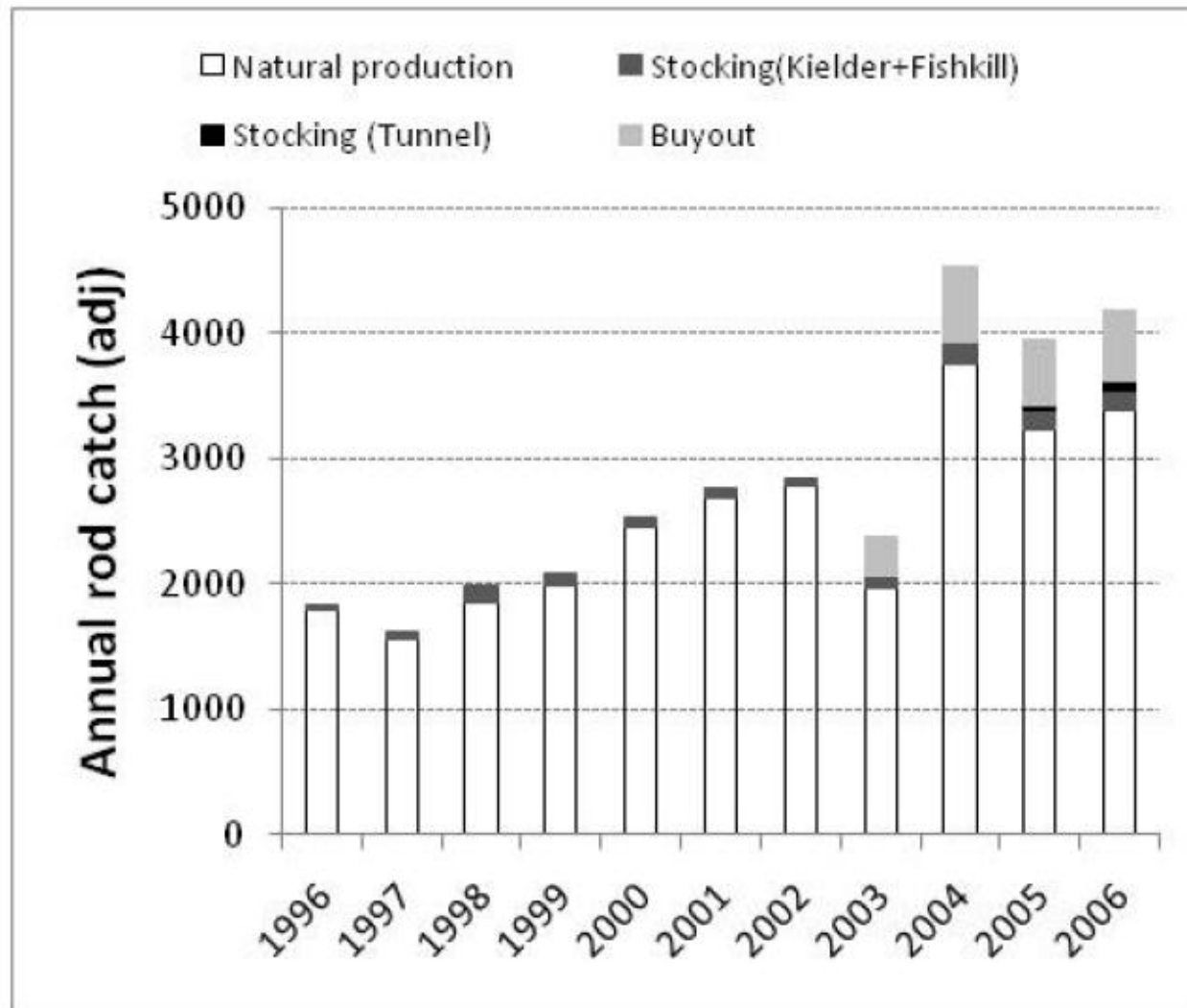


Figure 4.1 Approximate contributions to adjusted rod catch from stocking and net buyout, 1996 to 2006.

From Tyne Salmon Action Plan Review (APEM)

Resolving the conflict

- Must get better information on the impact of stocking. Better monitoring. Reliable monitoring.
- Must have faster and wider dissemination of reliable findings.
- This must include the failures as well as successes. Must find ways of overcoming the understandable reluctance to do this.
- If we all learn, fisheries managers and anglers alike, it must be better for salmon fisheries in the long run.