



## Trends in Spawning for Spring Salmon Populations



Typical spring salmon country: looking over the Baddoch trap site, down the River Clunie towards the Dee valley.

### The assessment of spawning escapement

The salmon fisheries of Scotland are of great economic and social importance. However, from a purely biological point of view, the fish that evade capture to spawn are even more important. These fish — and particularly the females — ensure the future productivity of populations.

Indirect estimates of the number of fish that escape the fisheries can be derived from fisheries data. Greater accuracy is obtained from direct counts made by fish-traps, although they are both expensive and difficult to run. Trapping also provides important information on the sex and age of the spawners, which cannot be obtained by other means.

### The Girnock and Baddoch Burns

Fisheries Research Services (FRS) operates traps on two tributary streams in the upper part of the catchment of the River Dee — the Girnock and Baddoch Burns. The traps catch adult fish ascending the streams to spawn and, later, they catch smolts on passage downstream. The Girnock has been monitored since 1966 and the Baddoch since 1988. Smolt-tagging studies show that both streams generate early-running or spring salmon (figure 1). This class of fish has suffered severe declines in recent decades. The results of the trapping operations are of special interest.

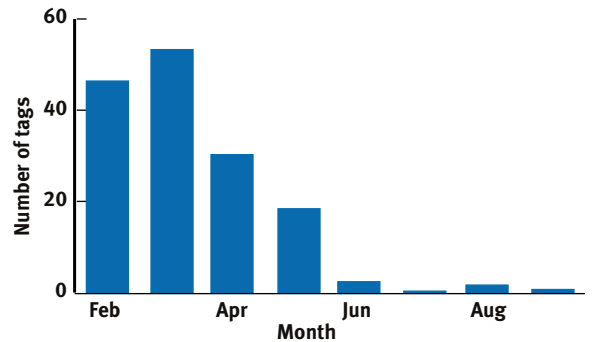


Figure 1: Salmon tagged at the Girnock and Baddoch Burns are captured in the coastal fisheries in the spring.

### Trap counts at the Girnock and Baddoch

As a rule of thumb, an annual minimum target of 30 females is set for each of the trapped streams. Thirty or more females are generally sufficient to replenish the streams with eggs.

Over the years, the number of salmon caught by the traps has varied widely (figure 2). In 1966, the Girnock received 156 females but in 1997 only nine. Over the period of the Baddoch trap's operation, female numbers have ranged from nine to 67. In general, the lowest numbers at both traps have occurred in recent years. In earlier years, the minimum target for spawning was usually exceeded but in recent years, this has not been the case.

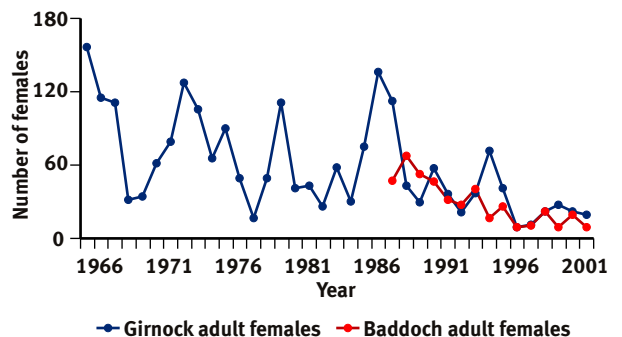


Figure 2: The number of female salmon returning to the streams each year.



## Return rates to the fish-traps

To examine the underlying changes more closely, we express each year's run of females as a proportion of the number of smolts leaving the same stream in the appropriate smolt-year. Most fish caught in the traps are two sea-winter (2SW) fish and these are attributable to the smolt run two years before. Some early-running grilse (1SW) are also caught, and these are attributable to the smolt run of the preceding year. Treating the numbers in this way provides an index of the return rate. Adult females are allocated to smolt-years and due allowance is made for the size of the smolt run. The results for both the Girnock and Baddoch Burns are shown in Figure 3. Return rates for the Baddoch closely mirror those for the Girnock.

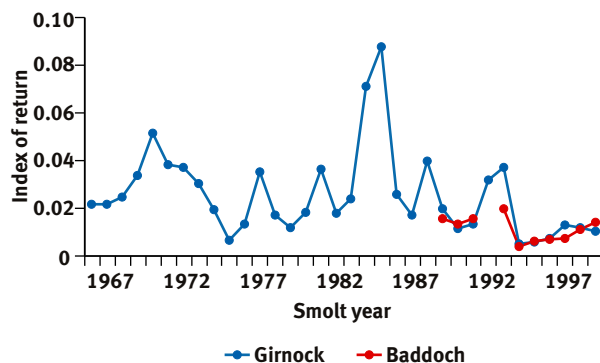


Figure 3: The proportion of smolts returning to the streams each year.

It must be remembered that large fisheries operated in West Greenland, near the Faroe Islands, on the Scottish coast and in the estuary of the river Dee in the period after the Girnock trap was built. These fisheries will have reduced the number of spawners in past years. All the fisheries have now ceased or are substantially reduced, but there has been no sign of a corresponding upturn at the traps.

The recent introduction of a catch-and-release policy has reduced, angling mortality within the River Dee. Yet, rates of return to both the Baddoch and Girnock traps have been lower in recent years than ever before. Undoubtedly, the declines in spawners would have been even more pronounced if catch-and-release had not been adopted.

## The wider context

Since trapping is both difficult and costly, it cannot be practised widely. However, information on catches can be used to examine the wider context. Analysis of the catch data shows that the declines evident for the Girnock and Baddoch Burns reflect the changing fortunes of spring salmon as a whole. This has been considered in a separate leaflet.\* The changes taking place are not a feature of particular streams or rivers, but part of a much wider change that has affected spring fish everywhere. Trapping shows, explicitly, just how much spawning populations of spring fish have declined.

## Summary

- In recent years, trap catches of spawning spring salmon have been below target levels.
- Over the years, large reductions have occurred in the fisheries. This should have resulted in increased trap catches. The observed reductions in trap catches are unexpected.
- Reductions in fishing mortality have been not been sufficient to compensate for increases in natural mortality at sea.

\**The Changing Abundance of Spring Salmon*