

# Mitigation of the effects of beaver dams on sea trout: a Scottish case study

Alan-Kettle White<sup>1</sup>, Roo Campbell<sup>2</sup>, Jenny Bryce<sup>2</sup>, <sup>1</sup>Argyll Fisheries Trust, <sup>2</sup>NatureScot  
 contact: jenny.bryce@nature.scot

## INTRODUCTION

- Beavers were introduced to Knapdale Forest on the west coast of Scotland in 2009 as part of the official Scottish Beaver Trial (SBT) 2009-2014.
- During SBT, the impact of beaver activity on fish was monitored by the Argyll Fisheries Trust.
- This included monitoring of the outflow of Loch Coille Bharr which runs 1.6 km from the loch to the sea. The outflow burn was not occupied by beaver during SBT.
- Since the end of the SBT, conifer plantation has been cleared from the floodplain, beavers have established a series of dams and an impressive beaver wetland has formed.
- The presence of dams and changes in fish habitat associated with the growing wetland, has raised questions about the potential for negative effects on migratory sea trout that use the burn and whose conservation status is in decline.
- Monitoring of fish habitats and populations was initiated in 2024, together with some modest dam modifications to facilitate beaver and sea trout co-existence at this site as an opportunity to learn more about the interaction of these species on smaller watercourses on the west coast of Scotland.

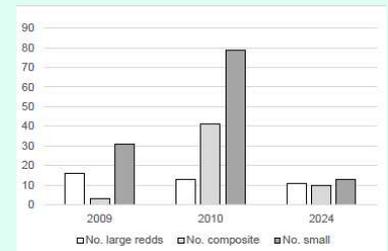
## METHODS

- Eight river sections were assessed for morphological characteristics (SNIFFER, 2006) and fish habitat suitability.
- Electrofishing was carried out at three sites upstream of the beaver wetland area (with electrofishing not possible in the wetland due to the depth of water).
- The redd counts of sea trout spawning carried out in 2009 and 2010 before beavers were present were repeated in 2024 where this was possible (limited by water impoundment).
- Following assessment, during key times for sea trout migration (October-December) notching and deepening of the existing by-pass channels was carried out at DAMS 1 and 2 (Figure 1).

## 3. Redd counts

- The 2024 assessment found a total of 34 redds at 27 sites. Most in the upper stream sections above the active beaver dams, but including 6 redds below the lower beaver dam.

Figure 7 Number of redds (2009-2024)



- This compared with 19 sites in 2009 and 52 in 2010. The number of redds was lower than the 50 in 2009 and 133 in 2010.
- Redd counts from 2009 and 2010 in the area that is now beaver pond found around a third of total spawning occurred this area.

## RESULTS

### 1. River habitats

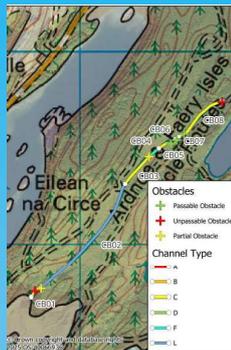


Figure 2 Stream channel sensitivity classification

- 31% plane rifle - Class C sensitivity. All but the upper river section showed signs of historic modification.
- 69% of channel is now occupied by beaver ponds – Type F channels due to stable characteristics.



Figure 3 Suitability and condition of fish habitat

- Habitat suited to juvenile fish was found in 6 river sections. Two sections (beaver ponds) only contained adult habitat.
- 16.8% of spawning habitat was assessed as optimal, with most river-bed substrates being partly compacted with fine sediment.
- Seven potential obstacles to migratory fish were found. One active beaver dam was assessed as passable in higher flows via a by-pass channel (DAM 2), fish passage was uncertain at a second active dam near the estuary (DAM 1).

### 2. Fish population surveys

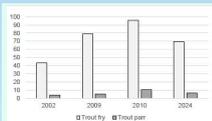


Figure 4 Observed density of trout and parr (no per 100m<sup>2</sup>) (2002-2024) at Upper Coille Bharr site

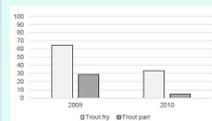


Figure 5 Observed density of trout and parr (no per 100m<sup>2</sup>) (2009-2010) at the Middle Coille Bharr site. It was not possible to survey in 2024 due to water impoundment

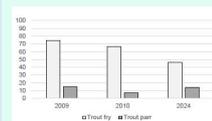


Figure 6 Observed density of trout and parr (no per 100m<sup>2</sup>) (2009-2024) at Lower Coille Bharr site

## CONCLUSIONS & FURTHER WORK

- The pass-ability of beaver dams is dynamic depending on flow rates, tidal influences and levels of beaver activity. Two active dams were considered likely to impede migratory fish passage and were managed during key spawning periods by notching and deepening of by-pass channels.
- An estimated 48.3% of stream length has been transformed from riverine into lacustrine habitat by four active beaver dams.
- The area of wetted habitat available to fish has increased by 40.4%, however, the habitat changes favour older life stages of sea trout and reduce the habitat for spawning and young trout.
- Around a third of spawning sites pre-damming, are now inundated by the main beaver dam.
- There is also a suggestion of a reduction in the density of juvenile trout compared with historical surveys. Further sampling may better inform any trends in recruitment.
- The presence of spawning redds upstream indicates that management actions taken to ease migration of fish were largely successful, but redds found downstream of the lower beaver dams suggest that not all sea trout were able to pass the dams. The timing of intervention may need to be earlier, with some large redds found below the lower dam at the time of notching.
- Further monitoring is planned to continue to assess the success of sea trout migration, spawning effort and mitigation at this location.

Figure 1. Drone imagery of beaver modified watercourse, Knapdale



Dam 1 (right) and Dam 2 (below) after deepening of by-pass channels to facilitate sea trout passage in October 2024

