

# TROUT FEEL THE HEAT IN THE FOREST

## *INSIGHTS FROM JUVENILE TROUT POPULATION SURVEYS*

The New Forest streams comprise the many westward-flowing Avon tributaries, the catchments of the Lymington and the Beaulieu Rivers and a multitude of smaller, self-contained streams such as the Bartley Water, Dark Water and Avon Water. These watercourses all support fish communities dominated by wild brown trout, a large proportion of which migrate to sea to feed, grow large and return to lay many thousands more eggs than if they had stayed in the river. Brown trout are a tough, adaptable species and, in the Forest in particular, they can cope with relatively warm, dry conditions. However, they are a cold-water species and have specific thermal limits.

Data from recent surveys indicates that these limits have been exceeded more often in recent years, reducing survival and putting the species under increasing pressure.

Due to the conservation and fisheries importance of New Forest sea trout stocks, the Environment Agency runs a programme of juvenile trout population surveys (using small-scale electric fishing equipment) at sites spread across the Lymington and Beaulieu Rivers: 14 sites on each river are surveyed once every six years.

Having completed the latest round last summer, we're able to compare the results from 2007, 2013 and 2019, a total of 84 individual surveys.



*This is what our surveys are all about: "young of the year" wild brown trout. Turfcroft, Ober Water, July 2019.*



*This is a non migratory Brown trout adult, who will spend its life in freshwater rather. Sea trout are the same species but spend most of its life at sea and return to freshwater to spawn.*

Map 1 shows the locations of the fourteen survey sites on each river, with the green markers sized according to the number of trout caught in 2019. Red markers indicate that no trout were caught.

Map 1

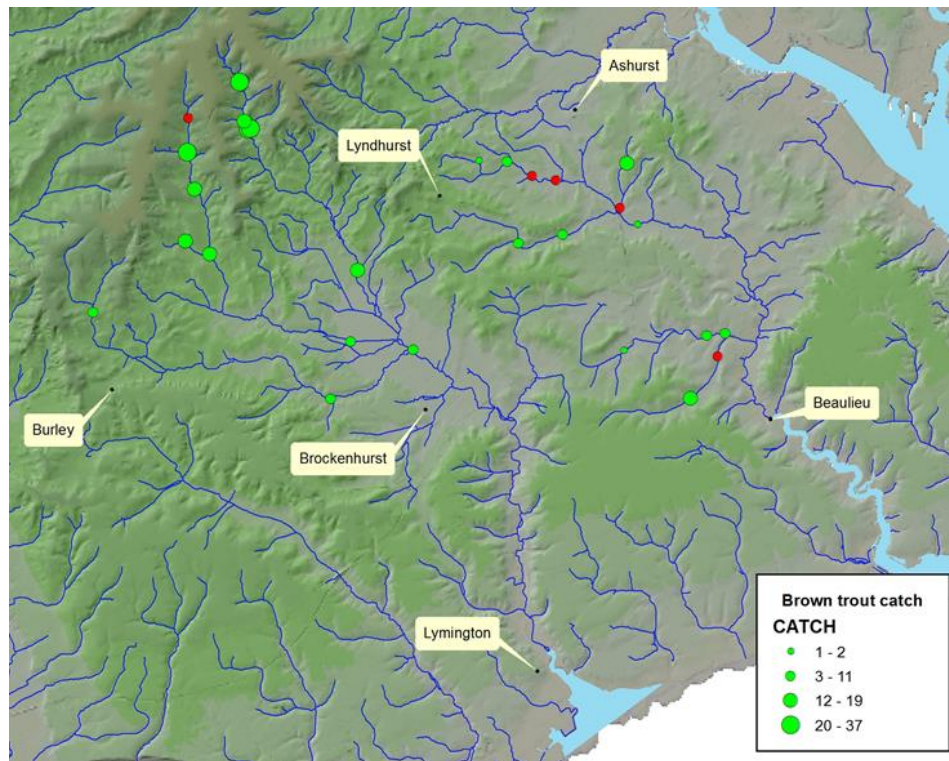
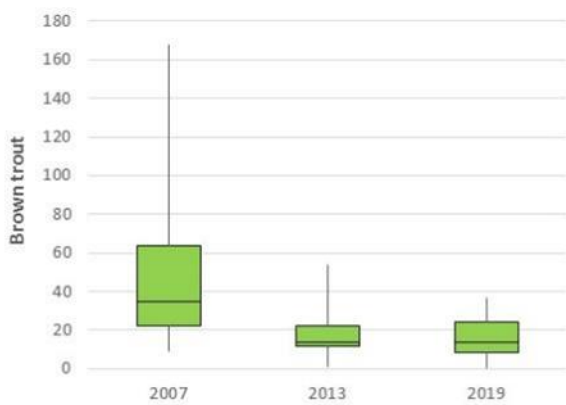
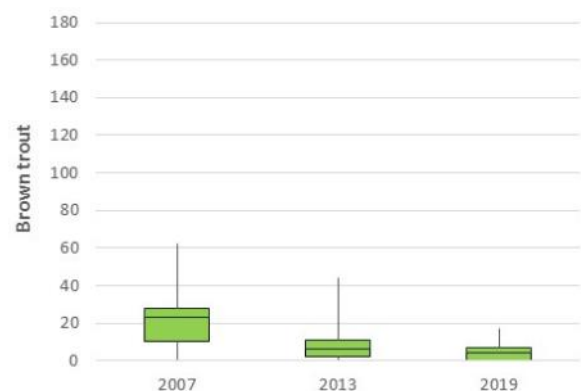


Figure 1 summarises the entire trout survey dataset: each "boxplot" represents all 14 brown trout catches on each river, in each survey year. The bars, or whiskers, show the maximum and minimum catches in that year; the bottom and top of each box represents the 1st and 3rd quartiles, respectively, and the line in the middle of each box is the median value. In short, the higher the upper bar, the top of the green box and the median line, the larger the trout population.



Lymington



Beaulieu

Figure 1: Brown / sea trout catch data box-plots

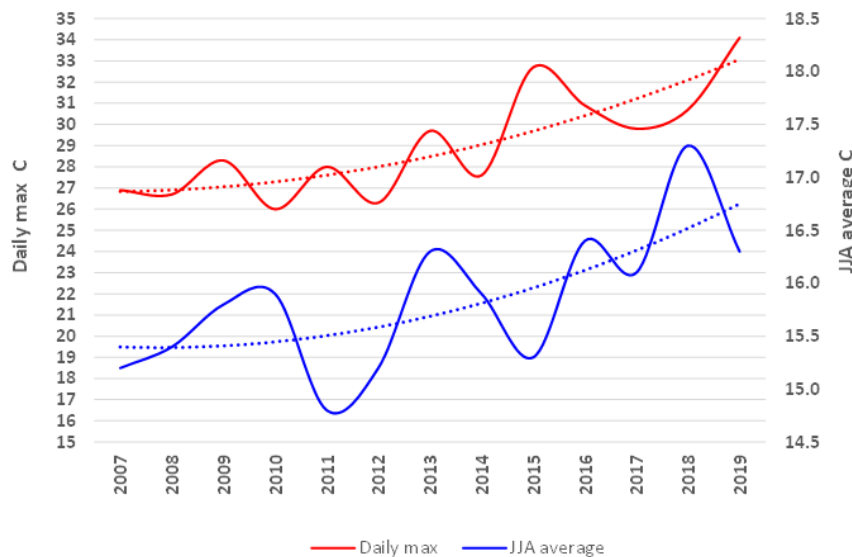
The five red markers in Map 1 and the low trout abundance on both rivers for 2013 and 2019 shown in Figure 1 are cause for concern - something has been suppressing trout survival in recent years. With the exception of reaches affected by historic drainage engineering, Forest streams are generally in pretty good physical condition, providing excellent trout habitat. In addition, as you would expect in a National Park, impacts from land use and industry are also generally of a low magnitude. So what factor could override good habitat and water quality and put trout populations under significant pressure? The most likely answer is: heat.

Across the South of England, we have seen evidence of declines in the most temperature-sensitive fish species (the salmonids) in recent years: Atlantic salmon, grayling and brown trout. Unlike the other two species, there has been less evidence of a problem in brown trout populations in water courses with more stable flows regimes, such as the Hampshire chalk streams.

However, New Forest streams are at the other end of the spectrum in terms of flow - they are more akin to ephemeral, upland streams, but exposed to a South-coast climate.

Since 2007, the year of our first comprehensive round of Forest fish surveys, both peak and average summer temperatures have been on an upward trend.

Figure 2 gives the highest daily maximum air temperature recorded and the average daily summer temperature (June, July and August) in the Met Office's Central England Temperature dataset for each year .



*Figure 2: Daily maximum temperature (red line, left-hand vertical axis) and average daily summer temperature (blue line, right-hand vertical axis) Central England (Hadley 2007-2019). Trendlines included for both graphs.*

Brown trout have specific thermal limits: maximum growth occurs at 13°C and growth ceases altogether at 19.5°C. The species' seven-day upper lethal limit is 25°C, so water temperatures between 19.5-25°C are critical and are likely to result in stress, disturbance to normal behaviour, higher susceptibility to disease and, ultimately, reduced survival.

But, there is potential to implement solutions to the pervasive threat of a warming climate at a local level.

It has always been the case that New Forest trout are dependent on "thermal refuges" in order to survive the hottest, driest periods each summer.

Thermal refuges are deep, dark, cool parts of the river, shielded from the blazing sun and warming breeze and in places which also provide the trout with the cover that they need as protection from predators. Refuge can be found beneath the deeply undercut roots of bankside trees , within the tangled mass of debris-dams, and in the scour-holes under fallen trunks and branches.

By ensuring the availability of these refuges, the thermal resilience of trout populations may be increased, but that will be to no avail if there's not enough water in the first place. As you would expect, the increase in summer temperatures has gone hand in hand with decreasing flows and more prolonged dry spells, the greater the pressure on trout.

The "reservoirs" of the Forest are the mires and raised bogs. They collect and store rainwater, and the more slowly and consistently they release it to the stream channels, the more stable the river flow regimes. Therefore, the health of the rivers is dependent on the health of the mires and bogs.

Finally, if water entering a shady woodland is already too warm, then it takes time and distance to shed that heat. One solution could be to identify reaches, where stream water is exposed to heat most intensively, and to focus efforts on diversifying habitats to reduce temperatures (carefully balanced against the needs of other very rare New Forest species).

To those of us that are fanatical about the Forest's trout, the sight of those little, spotty-brown fish darting to the surface of a shady pool to snatch a fallen caterpillar on a summer's afternoon, or of the mounded gravel of a freshly-cut redd in midwinter, are iconic sights of the Forest, but they're also indicators that stream-dwelling wildlife in general is thriving. Right now, these "canaries in the cage" are singing that their home streams are gradually becoming too warm for them and that we should take action now.

The full version of this report can be found on our Catchment Reports page [here](#)

Dom Longley, Senior Environmental Monitoring Officer, Environment Agency

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