

A Fish Stock Assessment of Lough Arrow, 2002

Management Proposals for this Resource



**M. O'Grady PhD.
K. Delanty MSc.
Central Fisheries Board
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Survey Methodology and Results

A total of 30 sampling locations were selected from the original 40 sites surveyed in 1994 (Figure 1). The sampling procedure involved setting gangs of gill nets over-night and servicing them the following day. Each set consisted of 7 nets of differing mesh size ranging from 2 inch to 5 inch (at half inch intervals). The type of survey nets used are capable of capturing all trout ≥ 19.8 cm in proportion to their presence and a cross-section of all other fish species present. Fifteen gangs of nets were set on each of two days. The majority of fish taken in the nets were retained for processing. This involved taking length, weight, scale samples and dietary analyses of all fish.

As a method for comparing numbers of fish caught in different lake surveys “catch per unit effort” (CPUE) is more commonly used. CPUE reflects the relative density of that species present in the lake. CPUE values, for any species, are obtained by dividing the total number of fish, for that species, by the number of net gangs set. It has proved to be a very effective management tool in illustrating the fluctuations in fish stocks over time (O’Grady, 1983).

The present survey yielded 271 perch, 39 pike, 23 brown trout (11 of which were returned to the lake) and 6 rudd. Details of numbers of fish caught per square are summarised in Table 1.

Length frequency distributions for the brown trout (Figure 2) taken in this survey show an absence of younger fish, in the 19 – 39 cm length range (or in the 2 – 3 year old range). More than 80% of the population were greater than 40cm and 3+ or older. Of the 11 trout stomachs examined contained large amounts of asellus, and in some samples other invertebrates were also found.

Pike numbers, in relation to the trout catch, were significant. A length frequency distribution for pike showed the majority of fish to be in the 35 to 80 cm range, with over 50% of the catch greater than 65cm (Figure 3). Dietary analysis found that fish were encountered in 8 of the stomachs examined, another seven contained invertebrates and 25 stomachs were empty. The large number of empty stomachs is characteristic of fish in

their spawning season. The majority of pike were ripe fish with a 2.88 to 1 female to male ratio.

A substantial number of perch were encountered during this survey. The stock were dominated by fish in the 22 to 27 cm length range, though fish as small as 12 cm and as big as 32 cm were also taken (Figure 4). Nets with the greatest number of perch in them were those that had been set in the deeper areas of the lake. The majority of fish were mature, with the female to male ratio being 4 to 3.

Rudd are also present in the lake, with a small number being taken in the survey. These few samples were between 21 and 24 cm in length.

Discussion

Total numbers of fish caught, during the netting operation, were with the exception of trout, relatively similar to the 1994 survey for pike and perch (Table 2) even though fewer nets were set. Trout numbers have continued to decline since the 1980 study. When CPUE values, for the three main species present, are compared across 4 separate surveys (1979 - 1980 – 1944 – 2002), it shows that trout have been in decline since 1980 while pike have been increasing since around that period (Figure 5). Perch numbers appear to fluctuate throughout the survey periods with a high in 1980.

When length frequency distributions for trout from previous surveys (1980 and 1994) are compared this lack of younger fish is even more obvious (Figure 2). Though the gaps in the different length ranges were starting to appear even in the earlier 1994 survey. Changes observed in the pike stock structure, since the 1994 survey, show the presence of pike from 35cm right up to 82.5cm with no age group missing (Figure 3).

Earlier data available for perch (1994) when compared with the 2002 data indicate the size structure of the population has shifted slightly with a greater proportion of the stock at greater lengths than before (Figure 4).

No rudd were captured in previous surveys.

Summary Comments and Management Recommendations

The decline in the trout stock in Lough Arrow over the period 1979 to date (2002) is of concern in fisheries management terms – a fall in trout C.P.U.E values from a figure of 2.83 in 1979 to 0.766 in 2002 suggests that the current trout population is now only circa 27% of the stock density present in 1979 (Table 2). This trend is also reflected in poor angling catches from the lough in recent years.

A comparison of the length frequency distribution of the trout population captured in samples in 1980 and 1994 indicates the presence of a balanced population on both sampling occasions. However in comparison the stock structure currently (2002) in Lough Arrow is very unbalanced – it is largely composed of bigger older fish ≥ 41 cm in length. These data suggest that either:

- a- recruitment of year-classes, currently 2, 3 and 4 year old fish, in 2002, was exceptionally poor, or
- b- the survival of 2, 3 and 4 year old fish (in 2002), following their recruitment to the lake, was very poor.

There is substantial evidence to suggest that the latter (b) is the case. A major stream enhancement programme was undertaken on all of the Lough Arrow feeder streams in the late 1990's. The effectiveness of this programme was monitored carefully since, in all streams, on an annual basis. Data indicate that, post-works, there has been a very substantial increase in the production of juvenile trout in these streams – estimates suggest an increased annual production of circa 58,000 fry and 1,500 1+ year old trout in these streams, which is almost an eight fold increase in numerical terms in trout production, post-works. This would have resulted in a greatly increased stock density of young fish in Lough Arrow in 2002 if these fish all survived.

The significant failure of these fish to survive in Lough Arrow to adulthood in repeated years may well be as a consequence of the greatly increased population of adult pike in the lake in 2002, compared to previous years. A comparison of fish numbers in the 1979 and 2002 surveys suggests a 4.5 fold increase in the pike stock over this period. Research has shown that the pike in question (predominately fish in the 50 to 80cm length range) specifically target trout, 25 to 40cm in length, as prey items. It is therefore hardly coincidental that it is this size range of trout which are most poorly represented in the 2002 survey (Figure 2).

The authors would recommend the following management initiatives:-

- 1- Purchase the finest mesh braided nylon gill-nets available to increase pike capture efficiency rates.
- 2- Increase the number of crews gill-netting for pike to three if possible for the next three years – thereafter a smaller number of staff would suffice.
- 3- Use the lake electrofishing equipment regularly on Lough Arrow once every few weeks for a year to see if there are specific times and/or locations where pike can be harvested efficiently - on Lough Corrib, over the last year up to 900 0+ and 1+ pike per day have been removed using this equipment. The pike in Lough Corrib were living in the charaphyte beds at depths of 3 to 3.5m. On Lough Corrib the most critical factor limiting the success of this technique would appear to be weather conditions, ie small stunned pike in circa 3m of water can only be seen and captured efficiently during very calm sunny periods (M. Butler, pers com.)

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