REPORT OF A WORKSHOP ON SEA TROUT ROD CATCH AND EFFORT DATA

11 and 12 March 2015, Plas Menai, Bangor

Introduction

1 The workshop was convened, in advance of the 2nd International Symposium on Sea Trout[1], to review existing approaches to the collection of catch and effort statistics from recreational fisheries for sea trout; it is intended that it will report its conclusions and recommendations to the Symposium

2 In recent years major advances have been made in this area, particularly in marine sport fisheries. On the other hand some of the approaches currently used to collect recreational angling statistics for sea trout are poorly designed, with little thought given as to the uses to which the data collected will be put. The recent Celtic Sea Trout Programme has clearly shown these flaws and weaknesses, which vary in nature and importance between countries. For example, in Ireland catches are estimated for rivers and most small sea trout are omitted from returns. In other countries the estimates for small sea trout, which dominate catches, are the least accurately recorded group. Fishing effort specifically targeted at sea trout, often at night, is also poorly recorded if at all. It was agreed that a more cohesive approach to this fundamental component of fisheries management was needed

3 It was noted that rod catch data serve two separate, but related applications, (1) as a measures of fishery performance and (2) as indices of in-season run size, equated often with stock. Both are vulnerable to reporting errors, but the second application is the more challenging, requiring an understanding of the relationships between catch and stock (see Shelton 2001, Shields *et al*., 2006 for discussion of this) and then of how fishing effort is influenced by other factors; for example fixed factors (eg river type) and variable factors (eg river flows).

4 Catch data are routinely used in assessments of stocks and fisheries throughout the sea trout's range. They are the connection between the scientists and the fishermen and both groups have an interest in the quality of the statistics. In addition to purely fisheries purposes, environmental impact assessments often call on catch data as the only long term data available on fisheries status. Therefore it is important to review catch data critically and then to make then as robust as possible.

Existing Systems

5 Graeme Harris gave an overview of the current catch and effort reporting systems in England and Wales, Ireland (the Republic only) and Scotland. As no one from Scotland was at the workshop, discussion focused on England and Wales and Ireland.

[1] The Symposium will be held from 20 to 22 October 2015 in Dundalk, Ireland. See http://seatroutsymposium.org/.

6 The workshop concluded that the arrangements for England and Wales, based on a system of individual rod licences and mandatory catch returns, provided the most comprehensive coverage. There is a requirement to report all sea trout caught; for fish >1lb weight, date and location (river) of capture, method and weight is required, while for finnock (<1lb) monthly totals of the number caught are asked for. It was agreed that it would not be practicable to ask anglers to report the details of all small sea trout caught, and that this information would in any case be of limited value. Effort, in terms of days fished (including blank days) is required, although the information does not distinguish between fishing for salmon and sea trout. Rates for returns are good, approaching 90%

7 The arrangements in Ireland are focused on salmon. There is no requirement to report catches of sea trout <40cm, which make up a large majority of the sea trout caught in Ireland. While fish above this size must be included in catch returns (and tagged if retained), this is primarily to ensure that they are excluded from the reported salmon catch. Annual returns of sea trout catches are based on estimates from Fisheries Officers on a limited number of the principal fisheries.

8 Scotland operates an entirely different system. Licences for individual anglers are not required, so returns are by fisheries, not anglers, and record the total numbers and total weights of adult sea trout and (separately) of finnock caught each month. There is no information on the number of anglers fishing for sea trout and no data on effort are collected. The return rate by fisheries is high, at around 90%

9 It was noted that the system used in England and Wales had produced a consistent and directly comparable long term set of data on catches, and while annual catches could be affected by variations in effort and catchability due to weather and other factors, the data produced a statistically credible pattern that suggested that changes in catches broadly reflected changes in stock levels. It was difficult, though, to assess the accuracy of the returns as a measure of the actual catch. On the Tamar, to give one, and possibly unrepresentative example, catch returns accounted for only 66% of the catches reported by riparian owners. The relationship between catches and sea trout numbers was also difficult to assess, given the relative lack of good counter data on sea trout.

10 Nevertheless, in spite of the various shortfalls, analysis of catch data from countries around the Irish Sea in the CSTP has shown remarkable coherence amongst data sets within and between regions, with as expected an important river specific component. For example, up to 35% of variance in regional catches between Wales, Northwest England, Galloway and Ireland in the period 1994-2011 was attributable to synchronous variation (i.e. of all the variation, 35% was due to catches fluctuating simultaneously). This may not translate directly or entirely to stock abundance change, because other factors influencing catch might have acted simultaneously between the regions; however it does demonstrate important signals in the catch data, even from disparate sources.

Improving Catch and Effort Data

11 The workshop agreed that there was a need for accurate information on catches. It was noted, however, that, it was unlikely that it would ever be able to ensure that all anglers who fished for sea trout submitted returns, or that the returns were 100% accurate. Catch returns therefore provided a sample, albeit a large one, of total catches and increasing the sample size would do little to increase the accuracy of the total catch estimate. A much more effective use of resources would be to concentrate on identifying sources of bias, such as failure to record blank days, affecting the estimates and on calculating their effect so that correction factors could be applied. **This could be done by developing carefully designed stratified samples on chosen rivers**.

12 In the longer term, use of stratified samples might make it possible to modify the information sought on catch returns, since some of the data being sought, and additional data, might be better captured through statistically valid sampling programmes. An additional point to bear in mind was that current systems required considerable amounts of data to be entered manually, which was costly (although electronic returns, which were being piloted in England Wales, and novel technology, which is discussed below, might help reduce costs). It was agreed, however, that **existing systems would need to be maintained, and run in parallel with any new ones, for a considerable period, as it is essential to maintain the integrity of long-term catch records.**

13 In Ireland, stratified sampling on a selection of rivers and loughs should be considered as a primary means of acquiring information on sea trout catches and effort, since this information was not currently provided through catch returns. This might well be more effective, in terms of both cost and accuracy of data, than extending catch returns to include all sea trout caught.

14 Lough Sheelin (4,000 acres – 16km ^{2}) in Ireland provided an example of the use of stratified sampling to estimate catches. Angling for brown trout on Sheelin takes place from boats, which use a limited number of quays. An aerial survey was used to count the number of boats on a sample basis, and catches were sampled by making a number of visits to each quay, on a planned basis, and thoroughly examining catches by all boats using that quay. This made it possible to produce an overall monthly and seasonal catch estimates for Sheelin within a small margin of error.

15 The workshop agreed that any catch return system needed to convince anglers that the information it produced was useful to them, and that this would apply particularly to sampling systems, since these would probably rely on the participation of volunteers – while a sampling programme run by professional fisheries or academic staff was feasible, it would be very costly. It was agreed that good catch returns would provide anglers and others with the following information:

- a description of changes in catch levels and size distribution, in particular in numbers of finnock, 1 and 2-SW maidens and MSW fish, from year to year;
- how particular rivers were doing in relation to others and changes in these relationships;
- a baseline from which to assess the impact of developments that affected rivers, such as hydropower schemes and fish farms;
- a basis on which to formulate season to season, conservation and management decisions;
- information on the general performance, and value, of a fishery.

16 The workshop noted that new technologies could provide novel ways of obtaining and recording data. On some rivers in North America drones were used to count the number of anglers fishing on a particular day. These could provide useful information on effort if not catches. Mobile phones could automatically obtain data on locations, and apps had been developed to record the time and location of an event; these could easily be adapted to record catches. It should be possible to develop ways of estimating lengths from photographs, which could be forwarded with the other data. Apps of this type would be equally relevant for other sport fisheries, for example bass, so there were opportunities for collaboration and economies of scale.

17 As indicated above, sampling systems would probably need to make use of volunteer anglers. Experience had shown that while volunteers were relatively easy to recruit, retaining them could be problematic. Nevertheless, programmes such as the Riverfly Partnership's Anglers Monitoring Initiative demonstrated that use of volunteers could be very effective. It would be important to ensure that volunteers were properly trained, and essential to provide full feedback; the more information that anglers were given about 'their' rivers, the more likely they were to remain enthusiastic.

18 The workshop concluded that stratified sampling, linked to the use of new technology, would be most effective if it was used on carefully selected index rivers. It would obviously be useful if these had existing counters, but this should not be a limiting factor. The aim, in each jurisdiction, should be to select a range of rivers representative of different types of rivers and stocks, and develop sampling protocols, making use of volunteers, that would provide accurate assessments of catch and effort and identify distorting factors in conventional catch returns.

19 It was agreed that the essential details that should be recorded for each fish were:

- Length. There was often confusion as whether this should be full length or fork length, and this needed to be standardised; fork length was probably easier to measure accurately;
- Time. This was important for distinguishing between daytime and night time catches;

- Location, using standardised local terminology, such as beat, pool etc, on each river;
- Method.

20 It would also be important to record effort. This might be done in terms of days (more than x hours per 24 hours) and part days/visits (less than x hours per 24 hours), although further thought was needed on whether this should distinguish between effort at night and during the day. It was agreed that it would not be worthwhile trying to fine tune effort data further by, for example, asking for exact hours fished.

21 The workshop briefly discussed whether the sampling system should try to include brown trout. It was noted that resident trout form an integral part of the trout populations that produce sea trout and that on rivers with established brown trout fisheries useful information would be obtained from data on catches. No conclusions were reached, and this is probably an issue that is best addressed on a river by river basis.

Recommendations

22 The workshop concluded that existing catch return systems should be retained, but recommended that efforts to improve the accuracy of data on catches and effort should be focused on developing systems of stratified sampling on selected index rivers. It further recommended that in designing such systems particular attention should be paid to:

- The purpose for which information was being sought;
- The need to address deficiencies and biases in information acquired from conventional catch returns;
- The practicalities of collection, bearing in mind the probable need to use volunteers.

23 The workshop noted that the situation in relation to catch returns differed significantly between the various jurisdictions, and concluded that no single system for improving catch and effort data was feasible. Accordingly, it recommended that appropriate systems be developed in each jurisdiction, taking account of local conditions and factors. It would, however, be beneficial to share ideas and best practices, and to seek to develop systems that would enable data from different countries to be compared. Where appropriate, for example around the Irish Sea, and where some degree of stock mixing is evident, there is merit in seeking to standardise data type and quality.

Participants

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References

Shelton, Richard (2002) The Interpretation of Rod and Net Catch Data: proceedings of a workshop held on 6-7 November 2001 . Atlantic Salmon Trust publication

Shields, B.A., Aprahamian, M.W., Bayliss, B.D., Davidson, I.C., Elsmere, P. and Evans, R. (2006) Sea trout (*Salmo trutta* L.) exploitation in five rivers in England and Wales. In: G.S. Harris and N.J. Milner. *Sea Trout: Biology, Conservation and Management*. Proceedings of First International Sea Trout Symposium, Cardiff, July 2004. Blackwell Scientific Publications, Oxford, 417-433