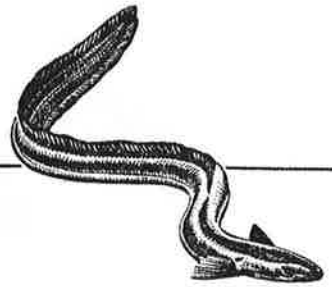


The National Anguilla Club

Vol 8 : 1 1971.

BULLETIN

Volume 8, Number 1. January, 1971.

CONTENTS

EDITORIAL

Few members will need reminding that there has been a considerable gap between this issue and the last, and it is therefore appropriate to begin with a sincere apology for this delay; a delay which has been caused (to use a well tried phrase) by circumstances largely beyond the Editor's control. Anyone who has recently been involved in the hiatus of house-purchase may realise just how far out of control things can sometimes be! During this time, a new year has begun and as there seems regrettably little chance of making up the 1970 deficit, we may begin also a new volume of the Bulletin in the hope that it will make more timely appearances than its predecessor.

During this time also, the writer has summarily removed himself from the company of the Yorks sub-group just at the time when the fortunes of that happy band appear to be in the ascendant. For those that remain, of course, the demise of 'Bootlace-Billy' will be no great loss; indeed the absence of the least successful is bound to boost their averages (in terms of eel size) to a considerable degree! Unfortunately, this line of reasoning does not fill 'Bootlace Billy' with any glow of unselfish pleasure. In fact, the thought of having to sort out alone the eel fishing prospects in a bewildering variety of strange waters brings into sharper focuss the many benefits of the team efforts of the last few seasons.

In terms of hard fact, the results of the Yorks group will probably be of great interest not only to themselves but to the Club as a whole. Some results have already been published in the pages of this Bulletin, and many more will follow.

There is, however, much more to team fishing than the bare results. If nothing else, the writer will miss those nocturnal 'brew-ups' which invariably resulted in a run for the angler who had travelled the furthest from his rods. There is no more dramatic or suspense filled experience than that of a heavily clad figure careering unsteadily around the bank of a placid lake in the dead of night and the agony of waiting for the feeble buzzing sound to stop before he gets there. Which leads to a peculiar observation. No matter how loud a bite detector is developed, there are those in Yorkshire who will snore on regardless. But let a teaspoon be rattled ever so slightly and the night is suddenly filled with dark figures bearing gigantic mugs,marching steadily towards the sound.

It might be thought that the pleasures of companionship might be severely tested by competition for the best spots. Not a bit of it!, each member had such definate ideas on his own type of swim that there was never any conflict. So fixed a pattern is this that the writer found he had mentally divided up a small Berks lake to accomodate the Yorks group when he had intended to assess it for himself. A smooth grassy promontary, commanding a wide sweep of open water was undoubtedly camp Arthur; little imagination was needed to visualise the palacial brolly and immaculate tackle of this most meticulous angler. A tiny quaking raft of rotting vegetation, hung precariously over deep water between a fallen tree and a bed of lily pads and reached only by long and hazardous wading was obviously Bowyer's hole. Here one could pander to one's sense of the hunter in primeval jungle, and here could be imagined solitary monsters in snaggy underwater caverns. Out of sight of the main lake was a small secluded bay where food could be consumed away from the ravening hordes. Clive would be there. That there was now no obvious swim left for the author did not matter - he would fit in somewhere. In any case, all the different swims in the lake would be covered and if the night was right we would soon know if there were any eels there.

How different for the solitary angler!

Alan Hawkins.

LOCH MORAR.

by Alan Butterworth

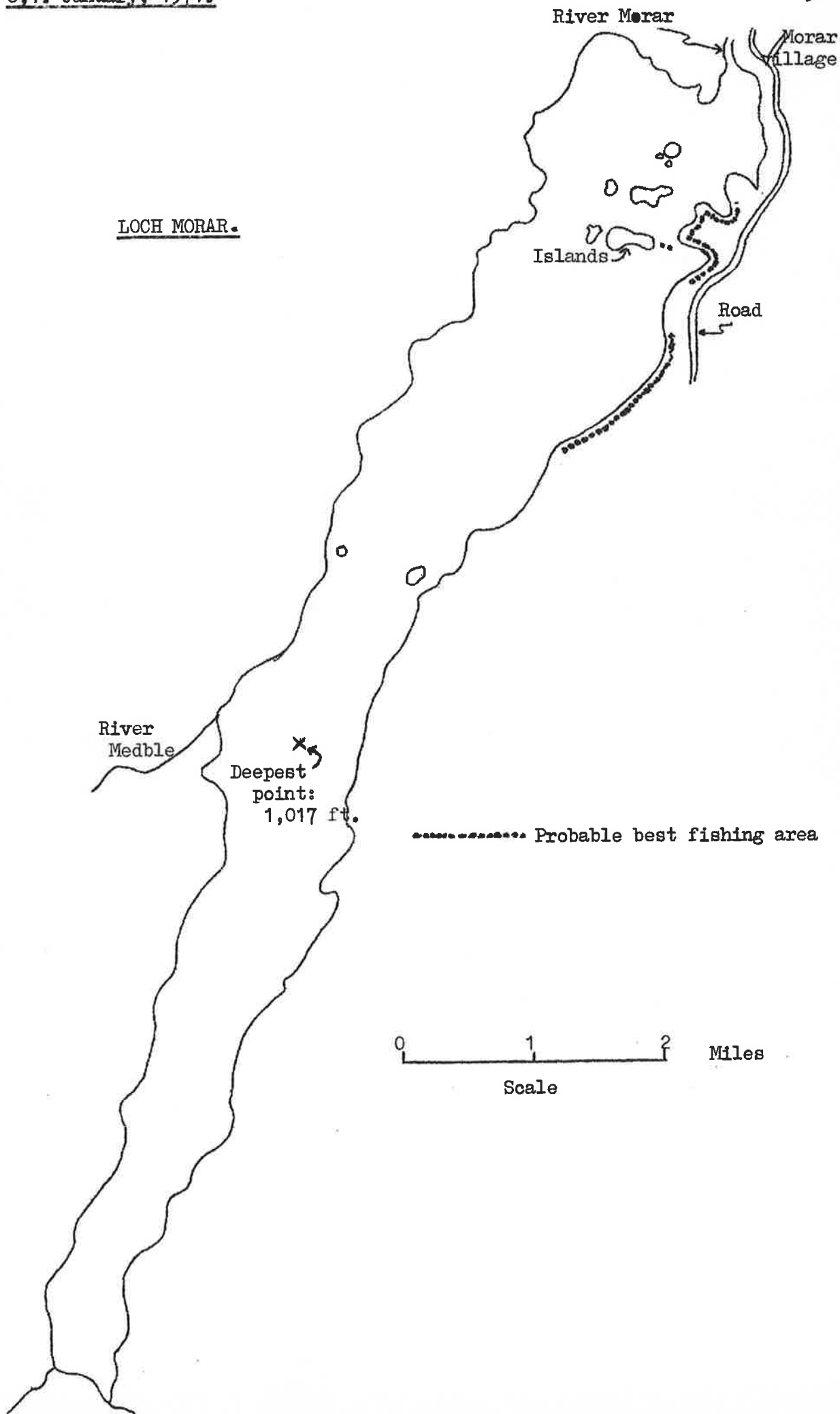
As many members know, at the A.G.M. it was suggested that Loch Morar might prove a suitable venue for a summer trip in 1971. I therefore thought that some information about the water might help members to decide.

The Loch is situated in the Western Highlands of Scotland about five miles south of Mallaig. It has recently come into the news because of reports of it being a harbinger of a "monster" similar to that of Loch Ness. I spent six weeks of last summer at Morar helping on an ecological survey of the place with a view to seeeing if indeed it could support a population of large predators (i.e. "monsters"). The Loch has the distinction of being the deepest water in Western Europe, having a maximum recorded depth of 1,017 feet, although it may have holes deeper than this as has proved the case in Loch Ness. It is 11½ miles long, with a maximum breadth of only 1½ miles, although the average is only just under 1 mile. The main part of the Loch, at the eastern end, is accessible only by boat and has only two inhabited houses near its bank, both about halfway along the Loch opposite each other. It is here that the Loch reaches its maximum depth, the bottom being rocky and steeply shelving and the bank is extremely bleak. Mountains up to 3,000 feet tower up on all sides. The village of Morar is at the western end of the loch, seperated from it by a series of small hills and in fact there are only half a dozen houses on the bankside here. This end is much shallower and has several small islands in the middle. The northern bank is easily accessible and it is along this bank that the best oportunities for fishing are afforded as it has both shallow and deep water with several small streams running in. The outflow, the river Morar, leaves at the extreme westerly end, and is one of the shortest rivers in the British Isles, only about 500 yards long. A small dam and fishpass has been built half way along its length which has raised the water level about 10 feet (the Loch surface being about 50 feet above sea-level).

The temperature of the Loch is on the low side as might be expected so far north, reaching a maximum of 59 F. in July, and a mimimum of only 43 F. in Winter, a temperature that is maintained throughout the year in the deeper water, and it is possible that the eels could feed all the year. The water is extremely clear and so pure as to be safely drinkable. The other fish species present are Salmon, Sea-Trout, Brown Trout, Char, Minnows and Sticklebacks, and reputably the Powan. The trout are of good size, and fish up to three or four pounds were caught on dead-baits.

During my stay at Morar I unfortunately had very little time for rod and line fishing, and much of what I did was in places I would not have visited by choice along the featureless banks at the eastern end in the open water. However, I did manage to catch several eels up to nearly two pounds, and also had wire traces bitten through on three occasions. The age/length for most of the eels was not very encouraging except in two cases. These two eels came from a shallow bay near very deep water - the same place where traces were bitten through and long-lines broken; these were baited with whole herrings! These two eels weighed about 1½lb., but were only 8 or 9 years old which is quite a good growth-rate. Many of the locals speak of big eels being caught on worms and being seen in the river in the Autumn. What I found most interesting are many reports of very large Anguilliform that have been caught from the Loch.

In the latter part of the nineteenth century, during a period of starvation, the locals used to set long-lines for eels, and amongst the captures were "10 foot long eels with manes around their necks". The captors of these were so terrified that they were immediately cut loose - and they could ill afford to lose their lines. The manes could possibly have been frayed pectoral fins


River Morar
Morar village
LOCH MORAR.
Islands
Road
River Medble
Deepest point: 1,017 ft.
Probable best fishing area
0
1
2
Miles
Scale

or flaps of loose skin. Even allowing for some exaggeration they must have been something remarkable.

In 1930, an eminent zoologist, whose name escapes me, was dragging the bottom of the Loch with large steel rakes, and again caught several of these creatures. He also was so terrified that he immediately let them get back into the water.

Another report occurrs in a book about the building of the Caledonian Canal; "these are the giant eels often referred to by local fishermen who occasionally hook them but few are landed. Some were killed when they were blasting the canal locks - and Johnny Fraser told me of ones caught some years ago in Loch Morar".

Two more reports of large eel-like creatures are more recent.

In 1954,"C.M., at that time keeper at Lettermorar (on the South Bank), was near to the hut when he saw some animal come shooting up out of the water to about the length of his arm. It reminded him of an eel, and he judged it to be a very big animal to cause such a commotion."

In July 1970 a Dr. Bass was talking about a hump he had seen in the centre of the Lovh and said - "the only species known to inhabit the Loch which could have produced such a hump was an eel."

Whether these tales are true or not I am not certain, except for the last one when I was also up there with Dr. Bass. I also saw a large hump, and the only known thing that could have made it was an eel, and a very large one at that. Obviously more research has to be done before anyone knows for certain.

The banks of the Loch are ideal for camping; although the conditions are not so luxurious as those at Castle Howard, they are more than adequate. The surrounding countryside must rank as some of the most beautiful in Scotland, and the Isle of Skye is only a short boat trip away. The are plenty of small lochs in the surrounding countryside all of which offer excellent trout fishing, and one of them has a Gaelic name which translated means "The Loch of the Water-Snakes" and is reputed to hold big eels. Eels do grow big in the west of Scotland as is shown by Ray Brown's 5-pounder caught last season while trout fishing in Skye, and I saw a couple going down the salmon trap which must have been over 4lbs.

Deadbaits are easily caught in the form of small trout from the Loch or small streams. Worms, unfortunately, are very scarce and would have to be brought up, but there are many large black slugs which could make an ideal bait.

The drawbacks are obvious. The most important is the distance which would have to be travelled, especially by those living in the South. The second is that this is an unknown water in which the eels should have a slow growth rate, but could hold a head of very large eels. The size of the place is off-putting, but by concentrating on the shallow bays and river mouths, good results are very likely.

I will almost certainly be going again next season to continue the work up there, and if anyone would like further information I will try and help them.

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DISEASES OF EELS.

by Brian Knott.

Like many anglers, my interest in fish extends to the world of aquaria. The tanks I have set up in the home are devoted to colourful tropical fish, a wise choice for a family man whose wife has no interest in coarse fishing. As I have this interest in aquariums I meet many people that have many species of fish and much more knowledge of things aquatic than I can ever hope to have. Through lengthy discussions with these fishkeepers I have learnt of the two diseases associated with eels and I have written below the facts as they were given to me.

Red Pest of Eels.

This is Pestis rubra anguillarum, a very serious disease caused by a comma-shaped bacterium, named Vibrio anguillarum. In aquaria this disease is not likely to occur, since Vibrio anguillarum is adapted to waters that contain much salt, its optimum being a salt concentration of 1.5 - 3.5%. Below 0.25% salt growth is completely inhibited. Thus, this bacterium cannot live in pure, fresh water, but occurs in brackish water and the sea.

Symptoms of this disease are the formation of extensive blood coloured areas on the skin. According to investigations, only eels that are going from fresh water into brackish water or into the sea to their spawning places are attacked. Vibrio anguillarum has also been found on other fish, such as Perch and Pike, where scale protrusion may be one of the symptoms. In Pike, inflammation of the cheeks may also be caused. In these fishes, no special conditions other than the salt concentration of the water are required for the outbreak of the disease.

Red Pest and Botches Disease.

In fresh water, a disease closely resembling the former may appear. The same symptoms may occur, while also botches showing a red colour appear. These botches are produced by ulceration of the cutis and the subcutaneous connective tissue. The ulcers are open and discharge their content of pus into the water. Consequently, the disease is very infectious. In good conditions, however, recovery is possible. This can be furthered by good aeration and frequent changes of water; constant running water is better.

The disease is supposed to be due to infection with a strain of Pseudomonas punctata, which has also been found in tumours in other species of fish, but then the botches do not generally show a red colour. Sometimes eye protrusion is produced. The strain of Pseudomonas punctata found in these infections has been identified as forma sacrowiensis, but later it was shown that the type was not sufficiently constant to justify this distinction.

Recently, some doubt has arisen as to the bacterium being the primary cause of this disease. It has been suggested that the primary cause might be a virus, Pseudomonas being a secondary invader only, analogous to what happens in dropsy. A decision cannot yet be made.

*

THE HERON BITE-DETECTOR.

by John Watson.

Having read with interest the recent articles on electric bite-alarms, I feel that it is about time I joined in and gave an account of the modifications I've made to my "Herons" during the last few months.

Initially, I dispensed with the original buzzer and box and replaced it with a "Protectalarm" which was attached to a 4½V. battery by a couple of crocodile clips wrapped in insulating tape, the whole ensemble being parcelled up in a piece of polythene sheeting. Having discarded the buzzer box, I found myself without a light. This small problem was soon solved when I stole the idea of fitting the light from the box into the sensor head (thanks Dave!). The bulb-holder and bracket were wedged into position (Fig.1.) and a third lead to the battery was installed. This was necessary in order to wire both buzzer and light in parallel. A small viewing hole was cut in the front plate and covered with red plastic.

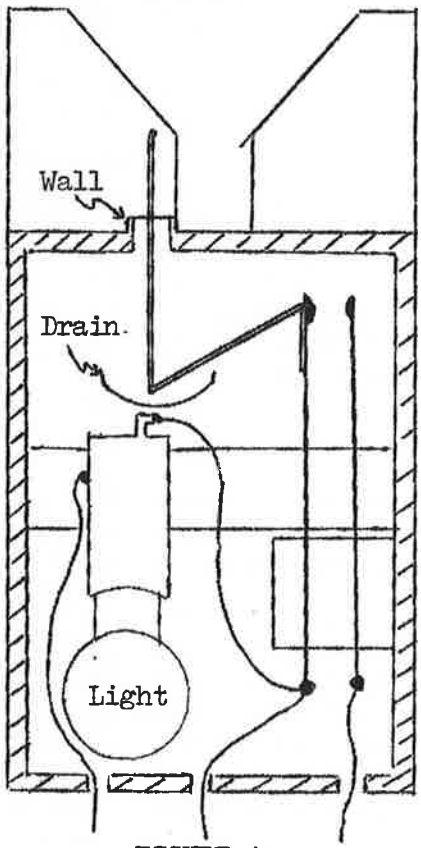

FIGURE 1.

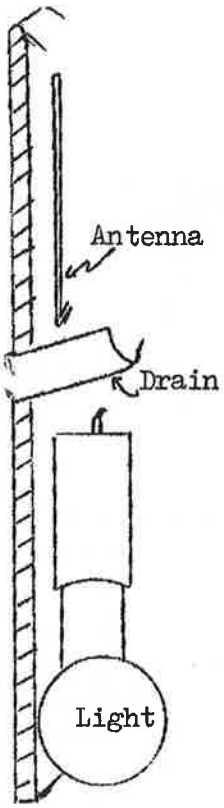

FIGURE 2.

This little set-up worked well for a couple of months until one night when it rained like hell; my 'waterproof' buzzers soon packed up and I spent the rest of the night watching silver paper indicators. Following this incident I decided to go the whole hog and weatherproof my alarms as effectively as possible.

I began by fitting a new antenna complete with crank inside the head, I tried the "outside" antenna but soon scrapped it for obvious reasons - see Coulson, NAC Bull., 7,3. p.61. This however posed a new problem - the light. The crank was directly above the bulb fitting and any water dripping down the antenna would obviously cause shorting. To overcome this I cut half an inch from the tip of a biro and slit it end to end to form a gutter; I then

positioned it in a hole drilled below the crank (Fig. 2). Thus any water was drained out of the back. I then went a stage further and built a small "wall" around the antenna exit hole to ensure that any water that should collect on the head would not drain in.

The wires from the buzzer/battery were soldered in and the whole unit given a couple of coats of a special weatherproofing paint; the antenna was painted white for obvious reasons.

The buzzers and further lights were housed with a 6V. battery in a waterproof wooden box, which also holds the sensor units when not in use. The depth of the box (3") and the thickness of the lid (½") did not allow much light to emerge from the holes made for that purpose. Consequently, a length of polythene tubing, wrapped in tinfoil, was fixed over the bulbs, thus directing the light upwards. The two viewing holes were covered with coloured plastic.

I now have two waterproof Herons, and while on the subject of Herons, in my opinion they are a damn good alarm and I feel they get a lot of unwarranted "stick" in the Bulletins. I admit they are not perfect, but you tell me one that is!

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Yorks Sub-Group Report: SANDBECK LAKE.

by Arthur Smith and Alan Hawkins.

Introduction

At first sight it may seem strange that we should choose to write at some length about a lake whose qualities as a big eel water are by any standards mediocre. Lest there be any doubt about it, let the reader be assured that the Yorks Sub-Group do, in fact, know of waters far better than Sandbeck following a highly successful hit-and-run campaign during last season. The rationale for this piece is derived from the belief that all waters have their story to tell, and that a glimpse of the reasons why Sandbeck should be so poor may be no less significant to the thinking angler than the cause of the "Greystones" of this world being so good.

No claim is made on our part to understanding the situation at Sandbeck. What we do have, however, is a number of ideas which being set out here may serve two main purposes. Firstly, we may highlight areas where knowledge of our quarry is scanty or lacking altogether in order to stimulate thought and discussion on the future development of the Session Reporting Scheme. Secondly, we may provide a useful introduction to subsequent articles concerning waters about which rather more is known and where we may begin to see some of the answers to the questions raised here.

As a start, then, let us look at the facts we do have.

Water Description

Sandbeck Park Lake is a Yorkshire water situated centrally with regard to three small towns, Maltby lying some 3 miles N.E., Tickhill 3 miles N.W. and Langold 3 miles S.S.E. It can be located on O.S. sheet 103 (Doncaster), map reference SK 575906. The water is the lower of two

artificial lakes on the estate of the Earl of Scarborough constructed about 120 years ago; it is dug out of rich agricultural land overlying a basically limestone substratum and lies approximately 150ft. above sea level. The map, (page 14.) shows the main features of this lake. From the upper (and larger) water two outlets merge to form a common inlet to Sandbeck at its western tip. A second source of water is a natural spring feeding into the lake on the northern bank. The eastern bank is constructed from limestone blocks, forming a dam sloping into the water at an angle of roughly 45°, and from which arise several outlets. At the extreme right of the dam is a simple overflow from which water flows down behind the lake forming a small stream passing through a duckpond in the farmyard to the East of the water, and eventually joining the river Tome. Except in conditions of drought, there is normally a continuous flow through this culvert, and it probably represents the means whereby eels enter and leave the lake. In the centre of the dam is a sluice gate, from which water used to be drawn off to provide a head for a mill in the farm; this is now disused and the sluice only opened on rare occasions to replenish the duckpond in times of water shortage. At the left hand end of the dam, the lake is extended into a small shallow pond leading to a ditch running away from the water. This ends blindly in the agricultural land beyond and is probably not significant in the movement of eels to and from Sandbeck.

The size of the lake is approximately 190 X 300 yds., although the area of open water is now considerably less than this. As fishing is restricted to the dam end only a rough idea of the depth can be given. Some twenty yards out from the centre of the dam a depth of 10" 6' is recorded, and it is entirely probable that this is the deepest part of the water. From the central 30 yds of the dam, the bottom shelves away steeply, so that a depth of 10" is reached only five yards out. Towards the ends of the dam, however, the depth becomes progressively less, being about 4" at the margins of the rooted vegetation. It would appear, therefore, that the Lake basin is approximately saucer shaped, with the deepest water close to the centre of the dam end and becoming progressively shallower towards the margins; probably also the water becomes gradually shallower as one goes further up the lake towards the western end where it is weeded up. The bottom is soft mud and silt, except in the vicinity of the culvert where the current removes the fine particles to leave a bed of coarse sand and grit.

The main areas of vegetation are indicated on the map (page 14). In the open water bottom weed growth is sparse (probably because of the high turbidity of the water). The dam end is also relatively free from weed, possessing only a few clumps of Amphibious bistort (Polygonum amphibium). The N.E. corner of the Lake (near the overflow) is choked with a heavy growth of Hornwort (Ceratophyllum demersum) and Water milfoil (Myriophyllum spicatum). Bounding the open water at the lake margins around the remainder of the pond is a dense band of Hornwort, loosely rooted in the bottom and up to eight yards thick in places. The dominant reed is the Norfolk reed (Phragmites communis), forming a broad band around the southern bank, parts of the northern bank and a thick bed at the western end of the water. Occasional clumps of Greatreedmace (Typha latifolia) are found within the Phragmites stands. A dense and impenetrable growth of Willows and Hawthorn bushes line the southern bank, and the Willow community extends across most of the western end of the lake.

Apart from eels, Sandbeck contains roach, perch, pike and tench. Of these, the roach are by far the most numerous and appear to be stunted. (This makes the aquisition of bait extraordinarily easy, even the novice can catch at least one a minute). The tench average about two pounds, although larger specimens up to 5½lbs have been recorded. The pike are also on the small side, a double figure fish being a rare capture, but although fairly numerous rarely give any trouble on DB intended for eels.

Data on insect life is sparse, and all that can be said is that it is prolific and aggressive, Sandbeck being an ideal testing ground for the efficiency of anti-midge preparations! Molluscs:- Swan mussel, Pea shells and Water snails- are all present in quantity and turn up in eel stomachs.

Fishing results.

The results from Sandbeck are almost entirely derived from a dogged assault throughout the 1969 season by one member, Arthur Smith, although the Editor was brought in for one weekend especially in order to prove that a blank trip could be achieved if enough care was taken to cast in the wrong places and to miss runs. Nevertheless, it is one of the most attractive waters to fish we have yet seen and at nights develops a particularly intense atmosphere redolent of huge fish just waiting to be caught. Instinct tells one that a record breaker is only minutes away, but alas the results show otherwise. Even so, one can be forgiven for going time and again, however dedicated one is to the capture of a monster eel.

The important features of the fishing at Sandbeck have already been documented (Coulson, 1969). It is a water with a fast rate-of-catch, and low medians and quartiles. Broken down into monthly totals, however, the rate of catch appeared to decline throughout the season, as is shown by the table below. (Little weight should be attached to the October figures which are based on only nine rod-hours and one eel). The possible significance of this result is considered later.

	June	July	August	September	October
RH.	54	24	48	104	9
E.	17	4	5	5	1
RH/E.	3	6	10	21	9

Of the 32 eels caught, only two exceeded 2lb. in weight; it is possible, however, that this ratio might have been improved had larger DB been used routinely. Readings of the twenty or so otolith sets collected through the 1969 season suggest a slow growth rate and so may serve to support the view derived from angling results.

Discussion

Sandbeck has the appearance of a neglected water which is gradually being overrun by the vegetation and converted back to dry land. At the western end this process is particularly well advanced, and a considerable area of water has already been removed in this way. The plant growth has another story to tell us, however. Many of the species present have a decided preference for base-rich, alkaline waters, which, taken in conjunction with the limestone rock in the area suggests that Sandbeck should be a relatively rich and productive water. This, however, suggests only that Sandbeck ought to be capable of supporting a large total weight of fish; it tells us nothing about the size individual fish may reach. Left to itself (as Sandbeck obviously has been) any water will eventually come to a state of balance, and this balance can either be towards a large number of small fish or a smaller number of large fish. As far as this water is concerned, the balance appears to have been struck in the direction of the former limit, at least in the case of the predominant species - Roach. In short, therefore, it seems probable that there may be little wrong with the lake in itself, but there may well be far too many fish in it.

(continued overleaf)

All this may well have been perfectly obvious to the reader from the start. It was included nevertheless to emphasise that the overall economy of a lake should be taken into account when assessing its potential. Let us therefore press on into ground which hopefully may prove less familiar and almost certainly more controversial. At this point also, it is only fair to point out that the following passages are the product of one author only, Alan Hawkins, and that any missiles or abuse that may be engendered should be directed solely at him.

Taken at face value, the low weights, the fast rate-of-catch and the slow growth rate find their most obvious explanation in terms of a food shortage for eels in this water. Two possible reasons for this may be advanced:

1. Too many eels (competition between eels for food).
2. Too many fish of other species (competition from other fish for food).

If we do not accept the evidence of our session reports at face value, another explanation can be added:

3. Angling results are misleading.

When we begin to consider factors such as competition, we are obliged to try and think in terms of the total population of eels in the water. For evidence, we draw upon data derived from an artificial 'angling population' which we have deliberately made as different from the real population as we can. When we compare one water with another, unless great care is taken, it is the 'angling populations' which will be compared and not the genuine ones. As the somewhat dogmatic statements above obviously require clarification, we will begin with explanation (3) above.

The only foolproof way of finding out how many eels a water holds, and how big they are, is to catch and measure the lot. As this implies draining the lake, and considerable hard work, the fishery officer makes life a little easier by taking samples using nets etc. which he hopes will be representative of the population as a whole. As anglers, we also take samples, but with precisely the opposite intention. We deliberately set out to bias our samples towards the biggest (and numerically fewest) eels; thereby establishing an 'angling population' whose attributes depend largely on how we set about catching it. To give an obvious example, drawn from the tables in last year's Special Report Issue (1), if two anglers set out to fish Stickney pit with the hope of catching a four pound fish, and one used only worms while the other employed only DB, it is more than probable that they would come to quite different conclusions about the eel population in the water. If a third angler used only maggots, his impression might again be different (and worse!). This leads to a fairly important conclusion about the interpretation of angling results in terms of weights of fish caught. The more we set out to select big eels - by using DB in preference to worms, for example - the less representative our catch becomes. In the example above, it is the angler who used maggots who would probably come closest to the truth about the size distribution of eels in Stickney.

If we really wanted to catch a representative sample of eels from a water, we would have to use tackle that gave us an equal chance of landing every eel, use a bait that every eel could take and that every eel was equally prepared to take, and finally cast to a spot where every eel had an equal chance of finding the bait! It would probably be simpler to catch a ten pound fish!

Turning now to a second item we may use in forming an assessment, rate-of-catch, a few moments reflection should show that this is even more difficult to interpret as a single measurement than weight distribution.

The most prevalent interpretation of this measurement within the Club appears to be that rate-of-catch is simply related to the numbers of eels in the water. As a corollary to this, comparison of rates-of-catch between waters may therefore be taken as an indication of the relative population densities of the fisheries. It is my belief that this simply is not so, as two quite seperate factors combine to give us this measurement:

1. Numbers of eels in the water (population density).
2. Time each eel has to spend in search of food (food availability).

Thus we ought not to assume that we will catch eels twice as fast in water A than in water B simply because water A contains twice as many eels per unit area. Suppose, for instance, food was so scarce in water B that the fish were obliged to spend all night every night searching for it, whereas in water A an abundance of food allowed the fish to feed every alternate night (on average) In these circumstances we may in fact catch eels from both at the same rate. Conversely, it can be seen the a difference in rate-of-catch between two waters does not of itself point to a difference in eel density between the two.

A third factor, little used but much discussed, is growth rate. The central problem here is to determine how far our selective angling techniques tend to catch us the fastest growing fish as well as the biggest. For example, if we used a bait large enough to prevent any fish under (say) two pounds from taking it, and then read the otoliths from all the fish in the 2 -2½ lb. range we caught, we might find their ages varied from 15-20yrs. A logical conclusion from this would be that the average eel reached two pounds after about 17 yrs, or, to put it the other way round, the average 17 yr. old fish weighed about 2lb. Now let us imagine we cast a net into the water and extract a perfect sample, read all the otoliths and write down the weights of all the 17 yr. old fish we catch. It is not inconceivable that the spread of weights could be from 1 - 2½ lb. We would obviously have to reduce our estimate of the weight at age 17 to the average of the new set of figures, quite possibly considerably less than 2lb. The size of the error that could be involved here must clearly depend on the spread of growth rate throughout the population. Thus, if the difference between the fast and slow growing eels was small, the error must be small; if on the other hand there was a wi e spread of growth rate within the population than the error could be fairly significant. In other words, by taking otolith readings of our rod-caught eels it is possible that the growth rate derived will be in excess of the true growth rate, and, as before, the discrepancy should increase with increased selectivity towards big fish in our angling methods. It is worth pointing out that such evidence as we have indicates that there is a wide variation between growth rates of individual fish in the waters so far studied.

By now, the reader may be wondering why we should bother with complexities such as those above, feeling that our 'angling population' is perfectly adequate to tell us all we need to know. On the other hand, if he has been 'over-persuaded' by the arguments, he may be wondering if our session reports do, in fact, tell us anything at all. It would seem wise, therefore, to attempt to summarise in general terms the sort of information our angling population can yield easily, and also to try to define the boundary beyond which things become more difficult.

Broadly speaking, the eels we catch are best able to tell us things that are general features of eel behaviour, be they big eels or small ones. Largely thanks to the untiring efforts of our President, we have an excellent reporting scheme which has been remarkably successful in doing just that. Such factors as temperature, time of year and light intensity in all its aspects - consider for example the recent article on the effects of moonlight (Coulson, 1970) - are all factors which the angling population can sort out for us. Less obviously, perhaps, but equally important we can

learn something about differences in behaviour of different sizes of eels, such as food preferences,by relating the catch to the size and type of bait we use. In fact, the bulk of the Special Report Issues of the past seasons have been concerned with this sort of information, and when it is realised that none of the facts contained in the Reports were previously known for certain (or even in many cases suspected to exist), it is obvious that the Club has learnt a great deal from its session reports and benefited accordingly.

It is when we start to argue from the general to the particular that the difficulties begin to arise. Naturally enough, we also want to know about the eels in the particular waters we want to fish (or are obliged to fish). We want to put judgements on places and say with confidence that water A is better than water B, or vice versa, and most probably the important criterion for making this assessment is whether or not the fisheries actually hold monster eels, irrespective of whether or not we can actually catch them. To do this, it is the true population of eels which needs to be considered.

The two lines of enquiry are complementary, and both are basic to the central theme of the scientific aspects of this Club - that of location of eels, especially big eels. However, it is only fair to say that whereas we have made great strides with generalisations, progress has been slow, to say the least, on the water-description side and the characteristics of individual fisheries.

If we are to make progress with this detailed appraisal of particular places, such descriptions are vital. As has been seen, interpretation of the bare angling results is fraught with hazards, but it can nevertheless tell us more than might appear at first sight and the more facts we have to juggle with the more likely we are to come to the right conclusions.

At this point, we may at last return to Sandbeck and with due regard to all the pitfalls outlined above, make some attempt to deduce something about the true situation in this water. We have seen that the fast rate-of-catch might be predominantly influenced by large eel numbers, or by lack of food for individual fish. Similarly, the low weights may reflect a true situation, or simply be a result of ineffective selection for big fish with the tackle used. Finally, we have a set of otolith readings indicating a slow growth rate; if these are in error it is more probable that they give an over-estimate rather than an underestimate. So on balance, it might be suggested that the eels probably do not grow to any great size, but more evidence would be useful.

Another line of evidence that might be tried is the trend in rate-of-catch over a period of time. For this to be meaningful, what is wanted is a reasonable number of sessions covering a reasonable time interval all spent fishing the same area and resulting in enough eels to show a definate trend. Because fishing at Sandbeck is restricted to the dam end, and because Arthur preferred the right hand side of this, we do in fact have almost exactly what we need. The situation is further inproved by the fact that the tackle was consistently arranged in the form of two DB rods plus one worm rod. Discounting the October figures as too small to be meaningful, the table on p.9 shows that in catching 31 eels the rate of catch fell to about 1/7 th. of its initial level. Part, though almost certainly not all, of this fall might be accounted for by the general trend for the rate to decrease as the season advanced (1). For the remainder, it might either be suggested that food increased as the season progressed, enabling the eels to feed for shorter periods, or that Arthur succeeded in drastically reducing the eel population normally feeding in that area. In the light of results from different pits, at different times (to be discussed in future articles), I tend to the latter view.

The interpretation of this result would, of course, be greatly helped by similar evidence from other waters. Nevertheless, if we consider that Arthur covered the bank from one end to just past the centre (or rather, his tackle did!) and from the margin to a maximum distance of approximately 40yds; 31 eels from an area representing at least a tenth of the total water surface may not seem a very large figure for a lake: that is generally reckoned to be overstocked. Also, we may suggest that the lack of any large fish even after catching a sizeable proportion of the catchable eels may point to there simply not being any really big eels to go for. Finally, this relatively small number may indicate that it was prolonged feeding spells (or hunger) which gave the initial fast rate rather than sheer over-population.

Before concluding, it is worth mentioning a last possible approach to this problem, based on a prediction from the model system of eel feeding behaviour developed in a previous issue (Hawkins, 1969). This model suggests that the hungrier an eel is, the less it will be influenced by changes in conditions; hence in a lake with a food shortage there should be less difference between good and bad trips, and total blanks should be fewer, than in a similar water with an abundance of food. Here, the fact that angling was always carried out from the same area is a positive disadvantage. Also, the model is an idea to be tested, not a principle to be used without critical evaluation; a lot of evidence from many waters is needed before we can get very far. Even so, blanks are almost unheard of at Sandbeck, and are often as much due to the bunglings of the angler as to lack of co-operation from the fish.(This is certainly true of the blank the present Author experienced!)

To sum up, therefore, it could be said that whereas each individual piece of evidence is open to doubt, collectively the data all points in one direction and leads to a fairly definate conclusion. There is still the problem of the main cause of the food shortage to sort out, however. For, although the difference revealed from the session reports between different clasees of waters (1) finds its most obvious explanation in terms of eel numbers and competition between eels for food, there are plenty of exceptions such as Stickney pit. In Sandbeck, for instance, one suspects that the eel population may be insignificant by comparison with the vast swarms of small to medium sized roach. My own view inclines towards the roach being the prime cause of newly entered eels finding life a bit hard.

In any case, the school of thought which suggests that eel numbers, and competition specifically between eels, is the best criterion for assessing the potential of a water to yield outsize specimens has very little to recommend itself. There is no possible reason for being encouraged from a succession of total blanks, quite the opposite. There may, in fact be no eels at all, or just a sparse population of bootlaces whose growth is retarded from other causes. Water assessment is a complicated business, and there are no short cuts.

*

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