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THE NATIONAL ANGUILLA CLUB

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A Report on the 1980 Reporting Scheme (Part I)

Contents

1. Introduction

1.1 General

The 1980 Reporting Scheme is the fourteenth year of investigative programmes. Once again, the format was slightly changed to give more significant analysis of different questions, more especially with respect to questions on angling variables compared with bait type. The format of the present Report Forms has substantially changed from those originally described in refs. (1) - (5), by Dr. T. Coulson, as many of the questions asked then have been answered.
(See Refs (21 - (32))
It is the Club's aim to constantly strive to upgrade the session report scheme to learn more and more about the science and art of eel angling. It is to achieve this that the 1981 scheme will introduce several innovations and questions.

This report describes and analyses most of the data derived from the 1980 work. A brief summary is included; tables of numerical data are separated from the discussions on data.

General explanatory matter and references given in previous Reports (7) - (9) and for all following years by Dr. T. Coulson, Dr. A. Hawkins and myself, and for instructions given in Guides (6) and all subsequent Guides including that for the 1980 Reporting Scheme are not necessarily repeated. Many members will not be familiar with refs (1) - (9), but most of the information has been incorporated in subsequent Reports. New members may need to refer to the Appendices on Conventions and Abbreviations (I) and on Significance Testing (II).

1.2 Members Performance

Fifteen members took part in the 1980 scheme and reported 270 sessions covering the capture of 194 eels in 8891 rod-hours of angling.

The number of eels ranged from 0 to 46 per member. The mean number caught was 13, the L.Q. was 5½ and the U.Q. was 15. The four (26·7%) most successful members (ie. those above the U.Q.) caught 118 (60·8%) of the eels, the five least successful members (below the L.Q.) (33·3%) caught 16 (8·25%) of the eels.

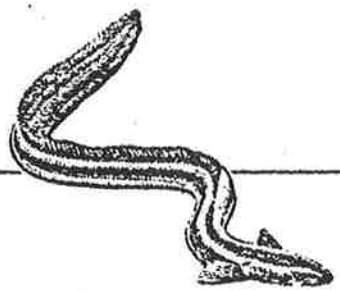
The effort ranged from 76 to 1900 RH per member. The mean effort was 592¾ RH, the L.Q. was 233½ and the U.Q. was 752 RH. The four (26·7%) most active members (ie. those above the U.Q) recorded 5383·25 RH (60·55%). The four (26·7%) least active members (below the L.Q) recorded 491·75 RH (5·53%).

Thus members as a whole were both more active and more successful than in 1979, although the extent of participation is again not evenly spread. The 1980 results alone correspond to some 25 years eel fishing experience by the mean member, and the consolodated results since 1967 represents over 350 years experience.

1.3 Individual Performance

The individual performance of members is summarised in Tables 1, 2 and 3. These illustrate the effort and success of all members for simple comparison.

In setting out these tables, it must be kept in mind that some members are very limited with respect to length of eel angling season and effort possible due to constraints of Water Authority or Club byelaws with limits on close seasons, night fishing and number of rods. Other variable constraints, e.g. work, family, financial impose other limiting factors. To establish a true comparison of effort, several seasons need to be considered before deciding if a member's contribution warrents continued membership.



The National Anguilla Club

Table 1. Performance of Individual Members. 1980.

Member	S	E	RH	0-1	1-2	2-3	3-4	4-5	5-6
R.Baczyk	32	16	793½	11	4	1	-	-	-
B.Crawford	38	46	1449	23	19	3	1	-	-
M.Davies	23	12	1241	2	7	3	-	-	-
S.Enkel	19	19	575	7	10	2	-	-	-
T.Hollerbach	16	13	260¾	2	1	5	5	-	-
D.Holman	37	37	1900	6	11	8	10	2	-
T.Jefferson	19	6	428	1	2	3	-	-	-
B.Layland	22	14	710½	2	9	3	-	-	-
C.Lee	15	5	438¾	2	2	-	1	-	-
A.Lister	18	7	331	-	1	2	1	3	-
A.Mitchell	6	1	272	1	-	-	-	-	-
E.Orme	3	0	76	-	-	-	-	-	-
A.Smith	6	5	93¼	4	1	-	-	-	-
K.Stephenson	5	5	116½	3	-	1	1	-	-
A.J.Sutton*	11	8	206	-	-	4	4	-	-
D.Walker	Nil.	No Session Report Forms received.							
(16 MEMBERS)	Only 15 took part in Analysis.								
TOTAL	270	194	8891	64	67	35	23	5	-
MEAN	18	13	592¾	4¼	4½	2⅓	1½	⅓	-

* = Reports not all received from A.J.Sutton.

Table 2. Performance of Total Members 1967-1980.(Excluding years 1977/78).

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1979	1980
No.Rep.	19	22	26	20	24	18	19	30	31	35	15	15
Med No.of E.	7	8	10	13	11	11	10	16	9	15	7	10
UQ	12	18	24	24	20	29	35	26	13	23	15	16
LQ	3	3	4	2	6	3	5	9	5	10	4	5
Med No of RH	329	266	288	255	479	425	525	486½	604	542	365	428
UQ	1184	442	662	357	742	650	1136	941½	855½	815	625	752
LQ	214	108	126	153	281	186	335	261	414	351	104	233½
Tot.E.	204	294	423	334	363	322	418	596	336	639	158	194
Tot.RH	11300	10100	11600	8200	11970	7534	13160	21781	21531	22158	6845	8891
RH/E	55	34	27	25	35	29	35	47½	73¾	35	43	46

It is also obvious from Table 1, that effort alone does not produce results of quality eels.

A comparison of 1980 with previous years is available from Table 2 and the totals, U.Q, L.Q, and Mean can be obtained from Table 3.

Table 2 illustrates that the effect of only 15 members reporting and active within the club, severely restricts the achievements. Out of at least 30 eels over 41b reported in the National Press and elsewhere, only 5 were captured by NAC members (John Sidley caught 19). In previous years we achieved ⅓rd to ½ the national figure. It is to be hoped that members have a more successful season in 1981.

In Table 3, a complete break down of members performance is described as to the types of baits used and at what stage of day or night. It can be observed that almost equal time was spent on worm and deadbait (4054¼ Vs 4536 RH). Also during the night, 2678¾ RH were spent with deadbaits Vs 2443¼ RH on worms. During the day 1784¾ RH were spent with deadbaits Vs 1683½ RH on worm. Therefore almost equal effort was given to Worm Vs Deadbaits both during the day and night. This is very useful for the following sets of analysis data, and these figures represent the information that for every 2 hours spent during the day with either bait, 3 hours were spent at night.

1.4 Summary of The Report

In an attempt to summarise the Report and being as general as possible in putting forward the obvious, but not always statistically significant trends concerning members and variables involved in our eel angling, the following is set out as a guide.

The average member in 1980 caught 13 eels from 592¾ RH giving a mean RH/E of 39·5. The overall result was slightly better than for 1970.

In order to be more successful, members need to consider the following variables to catch more 2+E.

Fish an East Bank, not more than 15 yds out in deep swims (20 feet+) for worm baits and shallow swims (0-5 feet) for deadbaits. Do not fish near snags or where there is dense weed, due to possible rejection of bait or losing a hooked eel. A sand/gravel, or mud/silt type bottom is preferred with clear water for worms, cloudy for deadbaits. If a heavy surface disturbance use worms, if non, use deadbaits. Use large hooks for worm baits (2+) and small hooks for deadbaits (16-12). Nylon traces are more productive for all bait types, with a length of at least 13". Try to use the finest b.s. according to the snags/weeds present. Freeline worms if possible and deadbaits, or use a light ledger. The bobbin type bite indicator is very successful. Mid water baits are very successful, ground-baiting during a session is detrimental but prebaiting works very well. If fishing during the day use worms, if at night either bait works well except for 41b+ eels when worms were more successful in 1980.

R. Baczyk and B. Crawford. Spring 1981.

Table 3. Individual Performance-Bait types Vs Day and Night. 1980.

Member	S	E	RH	RHDB	RHW	RHO	NRHDB	DRHDB	NRHW	DRHW	NRHO	DRHO	RH/E
R.Baczyk	32	16	793¼	560½	197¾	35	317	243½	103	94¾	23	12	49½
B.Crawford	38	46	1449	1063½	373	12½	572½	491	215	158	7	5½	31½
M.Davies	23	12	1241	532½	699½	9	286	246½	381½	318	-	9	103½
S.Enkel	19	19	575	341	226	8	165¾	103¼	185¾	112¼	-	8	30¼
T.Hollerbach	16	13	260¾	89¼	131½	40	70¼	19	117	14½	40	-	20
D.Holman	37	37	1900	308½	1464½	127	266¼	41¾	718¼	746¾	57¾	69¼	51¼
T.Jefferson	19	6	428	278	121¾	28¼	153¾	124¼	105¼	16½	23	5¼	71⅓
B.Layland	22	14	710½	438	263½	9	258	180	173	90½	5¾	3¼	50¼
C.Lee	15	5	438¾	393	45¾	-	228	165	27¼	18½	-	--	87¼
A.Lister	18	7	331	78½	246	6½	67¾	10¾	234½	11½	¾	5¾	47¼
A.Mitchell	6	1	272	84	188	-	60½	23½	112½	75½	-	-	272
E.Orme	3	-	76	76	-	-	43	33	-	-	-	-	-
A.Smith	6	5	93¼	56¾	36½	-	40	16¾	27½	9	-	-	18½
K.Stephenson	5	5	116½	63	39½	14	37¼	25¾	27¾	11¾	8½	5½	23⅓
A.J.Sutton	11	8	206	173½	21	11½	112¾	60¾	15	6	6¾	4¾	25¾
D.Walker	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	270	194	8891	4536	4054¼	300¾	2678¾	1784¾	2443¼	1683½	172½	128¼	881½
UQ	22	15	752	415½	254¾	31¾	262	165	200¼	103½	23	8½	61¼
LQ	8½	5½	233½	84	83¾	9	63¾	24½	65¼	13	6¾	5½	28
MEAN	18	13	592¾	302½	270¼	20	178½	119	163	112¼	11½	8½	58¾

2. The Overall Result

The overall result for 1980 is summarised in Tables 3(II), 4, 5(I) and 5(II).

Table 3(II) gives the overall picture of effort and success, however, this is given a more detailed analysis in Table 4 where eel weight distribution is compared with bait type and day or night.

As a direct comparison, 113 (58.25%) of eels were captured on worm, 73 (37.63%) of eels being captured on worms at night, from a figure of 33½ RH/E, 135¾ RH/2. However, although less eels were caught on deadbiat at night, 53(27.32%) at a slower rate of catch per eel, 50½ RH/E, for RH/2 the figure is similar at 134 RH/2 as for EW/N of 135¾ RH/2 and for RH/3 we have 382½RH for EDB/N compared with 407 RH for EW/N - again fairly similar - a more significant figure comes from RH/4 with 2678¾ RH for EDB/N compared with 1221½ EW/N, less than half. Therefore, overall, we can deduce that for 1980, worm was the more successful bait. To emphasise this last point we may consider the figure of RH/4 for EW/D of 841¾, this is ⅔rds of the RH/4 for EW/N. This illustrates the success of using worm during the day, especially so when RH/E for deadbaits used during the day are considered.

As a basis for further discussion, if Table 3(II) is compared with the overall result from 1970, that is the cumulative figures for 1967-70, the significant comparison can be made as follows:

	1980	1967-70 (4 years average)
RH/E	45¾	33
RH/2	141	180
RH/4	1778¼	1900
Median	1:07	1:1
UQ	2:04	1:11
LQ	0:12	0:10
IQR	1:8	1:1

Although the RH/E for 1980 is poorer, the rest of the data indicates a more successful approach to achieving bigger eels by the larger UQ and IQR.

Table 5(I) and 5(II) give a further breakdown of the time of the year compared with weight of eel and bait type. The significant comparisons are used by looking at RH/E and RH/2 for each variable.

It can be seen that for April, May, June, September and October, worms are more successful for RH/E than deadbait but in July and August, they are equally successful.

For RH/2, April, May, June and September, worms again are more successful, July and August are more successful for deadbait.

These trends carry on for RH/3 and RH/4 therefore indicating the success of worm during the early and late periods of the year, perhaps when water temperatures are lower than in the Summer months when water temperatures are higher an consequently eels' metabolisms' are working at a higher rate and require more food.

Table 3 (ii) The Overall Result. 1980.

WEIGHT RANGE	TOTAL N	1980 CF%
0-1	64	32.9
1-2	67	67.4
2-3	35	85.4
3-4	23	97.3
4-5	5	99.8

Total Eels	194
Total RH	8891
Mean RH/E	45¾
RH/2	141
RH/3	317
RH/4	1778½
Median	1:07
UQ	2:04
LQ	:12
IQR	1:08

Table 4. The Overall Result. 1980 - Bait types Vs Day and Night.

WEIGHT	E	E/DB	E/W	E/O	EDB/D	EDB/N	EW/D	EW/N	EO/D	EO/N
0-1	64	11	47	6	4	7	18	29	3	3
1-2	67	34	31	2	8	26	5	26	-	2
2-3	35	15	17	3	2	13	5	12	-	3
3-4	23	7	14	2	1	6	10	4	-	2
4-5	5	1	4	-	-	1	2	2	-	-
Total Eels	194	68	113	13	15	53	40	73	3	10
Total RH	8891	4536	4054¼	300¾	1784¾	2678¾	1683½	2443⅛	128¼	172½
Mean RH/E	45¾	66¾	36	23	119	50½	42	33½	42¾	17¼
RH/2	141	197¼	115¾	60	595	134	99	135¾	-	34½
RH/3	317½	567	225¼	150¼	1784¾	382½	140¼	407	-	86¼
RH/4	1778¼	4536	1013½	-	-	2678¾	841⅝	1221½	-	-
Median	1:07	1:08½	1:01	1:07	1:05	1:11	1:00	1:01	:04	1:11
UQ	2:04	2:03	2:04	2:06	1:08	2:04	3:02	1:15	:05	2:08
LQ	:12	1:01½	:09	0:08	:15	1:04	:10	:08	:04	1:03
IQR	1:08	1:01½	1:11	1:14	:09	1:00	2:08	1:07	:01	1:05

Table 5. Monthly Analysis by Weight and Bait types 1980. (April-July)

MONTH	APRIL				MAY				JUNE				JULY			
BAIT TYPE	W	DB	O	T	W	DB	O	T	W	DB	O	T	W	DB	O	T
WEIGHT																
0-1	6	3	-	9	10	2	1	13	8	2	1	11	11	2	1	14
1-2	10	-	-	10	5	6	-	11	4	7	1	12	5	8	-	13
2-3	4	-	-	4	2	1	-	3	3	1	1	5	1	9	-	10
3-4	-	-	-	-	1	-	-	1	2	1	-	3	1	5	-	6
4-5	1	-	-	1	1	-	-	1	-	-	-	-	-	1	-	1
Total E	21	3	-	24	19	9	1	29	17	11	3	31	18	25	1	44
Total RH	342¼	494½	21	857¾	676½	991	11	1678½	716	694½	120	1530½	445½	570¾	57½	1073¾
Mean RH/E	16¼	165	-	35¾	35½	110	11	57¾	42	63	40	49⅓	24¾	22¾	57½	24½
RH2	68½	-	-	171½	169	991	-	335¾	143	347¼	120	191	222¾	38	-	63
RH3	342¼	-	-	857¾	338¼	-	-	839¼	358	694½	-	510	445½	95	-	153¼
RH4	342¼	-	-	857¾	676½	-	-	1678½	-	-	-	-	-	570¾	-	1073¾
Median	1:04	:14	-	1:01	:12	1:05	-	1:03	1:00	1:01	1:07	1:01	:12	2:02	-	1:07
UQ	1:12	:14	-	1:12	1:13	1:09	-	1:10	2:00	1:09	1:12	1:15	1:00	2:15	-	2:04
LQ	:14	:14	-	:14	:02	1:02	-	:04	:06	1:00	1:00	:11	:10	1:09	-	:12
IQR	:14	=	-	:14	1:11	:07	-	1:06	1:10	:09	:12	1:04	:06	1:06	-	1:08

Table 5. (ii) Monthly Analysis by Weight and Bait types 1980: (Aug-Oct.)

MONTH	AUGUST				SEPTEMBER				OCTOBER			
BAIT TYPE	W	DB	O	T	W	DB	O	T	W	DB	O	T
WEIGHT												
0-1	7	1	3	11	2	1	-	3	3	=	=	3
1-2	1	11	1	13	6	2	-	8	-	-	-	-
2-3	1	1	-	2	6	3	2	11	-	-	-	-
3-4	-	1	2	3	10	-	-	10	-	-	-	-
4-5	-	-	-	-	2	-	-	2	-	-	-	-
Total E	9	14	6	29	26	6	2	34	3	-	-	3
Total RH	861¾	1320¾	53	2235½	805	413½	22½	1241	154¾	15	11¼	181
Mean RH/E	95¾	93⅓	8¾	77	31	69	11¼	36½	51½	-	-	60⅓
RH2	861¾	660⅓	26½	447	44¾	137¾	11¼	54	-	-	-	-
RH3	-	1320¾	26½	745	67	-	-	103½	-	-	-	-
RH4	-	-	-	-	402½	-	-	620½	=	-	-	-
Median	:11	1:08	1:11	1:07	2:08	1:14	2:08	2:07	:06	-	-	:06
UQ	:12	1:14	2:07	1:14	3:04	2:06	-	3:02	:07	-	-	:07
LQ	-	1:07	:09	:11	1:09	1:07	-	1:09	:06	-	-	:06
IQR	:12	:07	1:14	1:03	1:11	:15	-	1:09	:01	-	-	:01

3. The Effects of Angling Variables

3.1 Effects of Bank Choice — Table 6.1

As in 1979, the angler fishing an Eastern bank produced more eels, and in the case of worm baits, most of the bigger eels. Consequently the figures for RH/E and RH/2 are substantially lower than for the other banks.

The poorest bank appeared to be the South for worms and South and West for deadbaits in terms of RH/E and RH/2.

3.2 Effects of Distance Cast — Table 6.2

For worm baits, the successful distance was Near (0-15 yds) and Far (30+ yds) in terms of RH/E or RH/2. Far also produced the bigger range of eels. This is in direct contrast to the 1979 results where Median range (16-30 yds) produced the best results on worm.

Considering deadbaits, the near range produced the best results for RH/E and RH2. This is similar to the 1979 results.

3.3 Effects of Swim Depth — Table 6.3

The effect of depth using worm baits are obviously in favour for the deeper swims of 20+ feet for RH/E and RH/2, again with the larger UQ and median eel. In 1979, no sessions were put in at this depth, so we are unable to correlate at this stage.

For dead bait, the shallower swims - (0-5 feet), were most successful in RH/E and RH/2, and with a higher median eel. This partially substantiates the results for 1979.

3.4 Effects of Snags in the Swim — Table 6.4

Using worm baits, swims without snags were more productive for RH/E and RH/2, also for Median and UQ. This also applies to deadbaits. It may be significant that the RH/2 trebles for eels near snags. One may conclude that either eels do not feed near snags, or if they do and are hooked, they are often lost.

These results are in agreement with the 1979 figures. Note that for all baits 52 2+E were captured in clear water as against 11 2+E near snags. The corresponding RH are 5271.25 and 3619.75, giving a RH/2 total figure of 101.37 snag free swims, and 329.07 for snaggy swims, over 3 times the RH.

3.5 Effects of Weeds in the Swim — Table 6.5

If only a small amount of weed is present, then there is more chance of low figures for RH/E and RH/2 together with ahigh median and UQ weight for worm baits. The opposite is true for deadbaits as can be seen from table 6.5. The 1979 figures agree with those on worm baits but not for deadbaits. It may be that a similar situation to 3.4 above occurs, ie. loosing eels in snaggy swims or the eel feeling resistance and dropping the bait, for which there is more chance of deadbait in snaggy or weedy swims.

Table 6. Analysis of Swim Features Vs Bait. 1980.

Bait	Feature	E	2+E	RH	RH/E	RH2	MEDIAN	UQ	LQ	IQR
1.	BANK									
WORM	NORTH	20	4	835½	41¾	208¾	:11	1:04	:08	:12
	EAST	56	25	1586¼	28⅓	63½	1:12	2:13	:14	1:15
	SOUTH	22	3	977	44½	325½	1:00	1:07	:10	:13
	WEST	15	3	631½	42	210½	:12	1:00	:04	:12
DEAD	NORTH	16	5	1314½	82	263	1:03	2:04	:14	1:06
BAIT	EAST	20	7	919¼	46	131⅓	1:12	2:00	1:08	:08
	SOUTH	13	8	1113¼	85½	139	2:08	3:00	1:08	1:08
	WEST	19	3	1192	62¾	397⅓	1:06	1:10	1:02	:08
OTHER	NORTH	4	1	74½	18½	74½	1:00	1:07	:10	:13
	EAST	5	2	140	28	70	1:14	3:00	:15	2:01
	SOUTH	3	1	22¾	7½	22¾	:04	1:06	:04	1:02
	WEST	1	1	48½	48½	48½	-	-	-	-
2.	DISTANCE									
WORM	N (0-15yds)	51	11	1116	21¾	101½	1:01	1:13	:10	1:03
	M (16-30yds)	12	2	1144¼	95⅓	572	1:04	1:12	:08	1:04
	F (30+ yds)	50	22	1794	35¾	81½	1:07	3:02	:10	2:08
DEAD BAIT	N	23	10	1228¼	53½	122¾	1:11	2:10	1:04	1:06
	M	27	10	1812	67	181¼	1:11	2:03	1:00	1:03
	F	18	3	1495¾	83	498½	1:05	1:10	1:00	:10
OTHER	N	8	3	135	16¾	45	1:06	2:06	:10	1:12
	M	2	1	65¾	32¾	65¾	1:09	2:01	1:00	1:01
	F	3	1	100	33⅓	100	1:07	1:11	:14	:13
3.	DEPTH (ft)									
WORM	S (0-5)	34	10	1099½	32⅓	110	1:04	2:04	:11	1:09
	M (6-20)	55	8	2286½	41½	285¾	:14	1:08	:08	1:00
	D (20+)	24	17	668¼	27¾	39⅓	2:08	3:04	1:02	2:02
DEAD BAIT	S	23	11	828	36	75¼	1:14	2:03	1:04	:15
	M	30	7	2969	99	424	1:06	1:14	1:00	:14
	D	15	5	739	49¼	147¾	1:07	2:04	1:00	1:04
OTHER	S	-	-	49¼	-	-	-	-	-	-
	M	9	4	183	20⅓	45¾	1:14	2:10	:10	2:00
	D	4	1	68½	17	68½	1:05	1:07	:04	1:03

3.6 Effects of Bottom Type — Table 6.6

Here it would appear that for worm, a sand/gravel bottom is more productive for the larger eel with 24 2+E for a RH/2 of 71¾, together with a higher Median and UQ. These figures are correlated for deadbaits with 10 2+E for RH/2 of 145½. It appears that by inspecting the RH/2, worms are most successful, except for mud/silt bottoms.

In 1979, a mud/silt bottom was favourable for both baits, although the RH/2 were very close for the types of bottom Vs bait types.

3.7 Effects of Water Clarity — Table 6.7

Clear water was the most successful for worm baits for RH/2, and cloudy water most successful for deadbaits for RH/E and RH/2. It apparently takes twice as long to achieve 2+E in clear water as for cloudy.

The results for worm agreed with the 1979 figure and disagreed for deadbaits for 2+E.

3.8 Effects of Surface Disturbance — Table 6.8

For worm baits, a heavy surface disturbance produced 15, 2+E at 48¼ RH/2, a very good result with a high median and UQ weight. For deadbait, no surface disturbance produced 13, 2+E at 170 RH/2. This agrees with the 1979 results.

Table 6. Continued; Analysis of Swim Features Vs Baits. 1980.

Bait	Feature	E	2+E	RH	RH/E	RH2	MEDIAN	UQ	LQ	IQR
4.	SNAGS									
WORM	YES	30	4	1251	41¾	312¾	:11	1:09	:04	1:05
	NO	83	31	2803¼	33¾	90½	1:04	2:08	:12	1:12
DEAD										
BAIT	YES	23	5	2273¾	98¾	454¾	1:08	1:14	1:01	:13
	NO	45	18	2262¼	50¼	125½	1:11	2:08	1:04	1:04
OTHER	YES	6	2	95	15¾	47½	1:00	1:11	:09	1:02
	NO	7	3	205¾	29⅓	68½	1:14	2:10	:09	2:01
5.	WEED									
WORM	NIL	54	6	2277	42	379½	:12	1:00	:04	:12
	SPARSE	57	29	1429¾	25	49⅓	1:13	3:02	1:00	2:02
	DENSE	2	-	347½	173¾	-	1:09	-	-	-
DEAD										
BAIT	NIL	37	13	1576	42½	121¼	1:07	2:01	1:00	1:01
	SPARSE	15	3	1850¾	123⅓	617	1:09	1:14	1:06	:08
	DENSE	16	7	1109¼	69⅓	158½	1:09	2:12	1:02	1:10
OTHER	NIL	11	4	188¾	17	47	1:07	2:03	:08	1:11
	SPARSE	1	-	37½	37½	-	-	-	-	-
	DENSE	1	1	74½	74½	74½	-	-	-	-
6.	TYPE OF BOTTOM									
WORM	MUD/SILT	55	7	1833	33⅓	261¾	1:00	1:09	:08	1:01
	SAND/GRAVEL	41	24	1721	42	71¾	2:06	3:03	:12	2:07
	ROCK/BOULDERS	17	4	500¼	29½	125	:12	1:14	:04	1:10
DEAD										
BAIT	M/S	45	11	2378¼	52¾	216¼	1:07	1:14	1:00	:14
	S/G	16	10	1454½	91	145½	2:11	3:04	1:14	1:06
	R/B	7	2	703¼	100¼	351½	1:06	1:15	1:02	:13
OTHER	M/S	4	-	146½	36½	-	:05	:06	:04	:02
	S/G	5	3	113¼	22½	37¾	2:10	3:02	1:14	1:04
	R/B	4	2	41	10¼	20½	1:12	2:00	1:07	:09

Table 6. Continued. Analysis of Swim Features Vs Baits. 1980.

Bait	Feature	E	2+E	RH	RH/E	RH2	MEDIAN	UQ	LQ	IQR
7.	CLARITY OF WATER									
WORM	CLOUDY (CLO)	47	8	1463½	31	183	1:00	1:11	:08	1:03
	CLEAR (CLE)	57	23	1962	34½	85⅓	1:06	2:08	:12	1:12
	VERY CLEAR (VC)	9	4	628¼	69¼	157	:08	3:06	:04	3:02
DEAD										
BAIT	CLO	27	10	1161¼	43	116	1:11	2:02	1:00	1:02
	CLE	32	10	2204¼	69	220½	1:07	2:04	1:04	1:00
	VC	9	3	1170	130	390	1:10	2:12	:14	1:14
OTHER										
	CLO	1	-	123¼	123¼	-	-	-	-	-
	CLE	10	4	147½	14¼	36¼	1:10	2:03	:12	1:07
	VC	2	1	29½	14¼	29½	1:09	-	-	-
8.	SURFACE DISTURBANCE									
WORM	NIL	54	15	1961¼	36⅓	130¼	1:00	2:00	:08	1:08
	SLIGHT	39	5	1376½	35⅓	275⅓	1:00	1:08	:08	1:00
	HEAVY	20	15	723	36	48¼	2:14	3:03	1:13	1:06
DEAD										
BAIT	NIL	24	13	2209½	92	170	1:14	2:10	1:07	1:03
	SLIGHT	32	7	1668¼	52	238½	1:07	1:14	:14	1:00
	HEAVY	12	3	651¼	54¼	217	1:06	1:14	1:00	:14
OTHER	NIL	9	4	174¼	19½	43¼	1:14	2:10	:15	1:11
	SLIGHT	4	1	99	24¼	99	:07	:10	:04	:0(
	HEAVY	-	-	27	-	-	-	-	-	-

4. The Effects of Tackle Variables

4.1 Effect of Hook Size — Table 7.1

Large hooks (2+) appear to be more successful than smaller hooks with a RH/E of 30, RH/2 of 77, although the difference between the RH for hooks do not appear to be significant to cause concern with the largest RH/2 still only 132. The larger eels appear to be caught on the smallest hooks (16-12) for medium and UQ weights.

For deadbaits, surprisingly, the small hooks (16-12) are very much more successful with RH/E of 32 and RH/2 of 96. However this only applies to one eel caught of 2+. The corresponding RH of worm Vs deadbait appear in favour of worm baits.

4.2 Effect of Trace Type — Table 7.2

It is obvious from Table 7.2 that members do not use wire traces with worm baits - those that did for some sessions, did not catch any 2+E. The figures for RH/2 are very good at about 100.

For deadbaits the RH/2 increase significantly from nylon to wire traces - up to 4 times the RH are required. This perhaps indicates that eels may indeed detect the wire trace and reject the bait. It makes a reasonable case for using small fish portions with nylon traces and striking very quickly on the first run.

4.3 Effect of Trace Breaking Strain — Table 7.3

For both worm and deadbait, the RH/2 indicate that lighter traces produce more eels over 2+. Also for worm baits, a bigger Median and UQ. No 2+E were captured on light traces with deadbaits.

4.4. Effect of Trace Length — Table 7.4

Worm baits appear more productive at 87½ RH/2 with longer (13"+) traces, but no significant difference in RH/2 for deadbaits.

4.5 Effect of Line Breaking Strain — Table 7.5

Again, as with trace b.s., the light b.s. line is very much more productive, for RH/E of 20, for RH/2 of 33 and for a higher median and UQ. It is very significant then when using worm baits to have a light nylon trace or main line.

As with trace b.s., the light line b.s. produced no 2+E. Perhaps these were bitten through?. The figure of 192 RH/2 for 23, 2+E is fairly high. It is also significant to note that no member in 1980 used lines of 16+ b.s. with any bait.

4.6 Effect of Ledger Weight — Table 7.6

For worms, using no weights at all, a very good result for RH/E of 19½, together with RH/2 of 37 was achieved. There is a surprising increase for weights in the 0-1oz range of 39½ RH/E and 255 RH/2. For deadbaits, the most success was with nil or light ledger weights.

Table 7. Analysis of Tackle details Vs Bait.1980.

Bait	Feature	E	2+E	RH	RH/E	RH2	MEDIAN	UQ	LQ	IQR
1.	HOOK SIZE									
WORM	S (16-12)	5	3	329½	66	109¾	3:02	3:03	:04	2:15
	M (10- 4)	85	23	3038	35¾	132	1:00	2:01	:10	1:07
	L (2 ++)	23	9	693¼	30	77	1:13	2:06	:13	1:09
DEAD BAIT	S	3	1	96	32	96	1:04	1:14	:12	1:02
	M	16	6	1147	71½	191	1:07	2:10	1:00	1:10
	L	49	16	3286½	67	205½	1:10	2:03	1:01	1:02
OTHER	S	2	-	37½	18¾	-	:04	-	-	-
	M	9	5	202	22½	40½	2:00	2:10	:15	1:11
	L	2	-	61¼	30½	-	1:00	-	-	-
2.	TRACE TYPE									
WORM	No Trace	38	8	866¾	22¾	108⅓	:12	1:12	:04	1:08
	NYLON	66	27	2704½	41	100	1:07	2:14	:12	2:02
	S.S.W.	2	-	162½	81¼	-	-	-	-	-
	M.S.W.	1	-	48	48	-	-	-	-	-
	NCMSW	6	-	279	46½	-	:14	1:00	:08	:08
DEAD BAIT	No Trace	16	8	496½	31	62	1:15	2:03	1:06	:13
	NYLON	24	10	1381½	57½	138	1:08	2:10	1:05	1:05
	S.S.W.	12	1	686¾	57¼	686¾	1:05	1:11	:12	:15
	M.S.W.	9	1	483¼	53¾	483¼	1:00	1:08	:08	1:00
	NCMSW	7	3	1481½	211	493¾	1:15	3:00	1:12	1:04
OTHER	No Trace	7	4	105	15	26¼	2:06	2:13	1:07	1:06
	NYLON	3	-	136	45⅓	-	:04	:05	:04	:01
	S.S.W.	-	-	22½	-	-	-	-	-	-
	M.S.W.	-	-	11¼	-	-	-	-	-	-
	NCMSW	3	1	26	8¾	26	1:07	1:11	:15	:12

4.7 Effect of Indicator

Table 7.7

There are a varied selection of bite indicators used by members, and an effort is made to analyse possible effectiveness.

For worm, there is no significant difference in RH/E but the simple bobbin produced 4, 2+E at 41 RH/2. Apart from that figure, the other RH/2 totals were not significantly different.

Considering deadbaits, bobbins were again unusual with 3, 2+E at 17½ RH/2 and in-line sensor very poor at 487 RH/2.

Obviously much more effort and eels need to be considered to make the results more significant.

Table 7. Continued Analysis of Tackle Features Vs Baits. 1980.

Bait	Feature	E	2+E	RH	RH/E	RH2	MEDIAN	UQ	LQ	IQR
3.	Trace B.S.									
WORM	L (0-5 lbs)	5	3	240	48	80	3:02	3:03	:01	3:02
	M (6-15)	69	24	2914	42¼	121½	1:02	2:07	:10	1:13
	H (16+)	1	-	40	-	-	-	-	-	-
DEAD										
BAIT	L	3	-	306	102	-	1:11	1:13	1:06	:07
	M	46	14	3211	69¾	229⅓	1:08	2:09	1:01	1:08
	H	3	1	516	172	516	1:08	1:14	1:07	:07
OTHER	L	2	-	37½	18¾	-	:04	-	-	-
	M	4	1	158¼	39½	158¼	1:07	1:11	:14	:13
	H	-	-	-	-	-	-	-	-	-
4.	Trace length									
WORM	S =(0-6")	-	-	77	-	-	-	-	-	-
	M =(7-12")	36	5	1189¾	33	238	:12	1:03	:08	:11
	L =(13" +)	39	22	1927¼	49½	87½	2:04	3:03	1:02	2:01
DEAD										
BAIT	S	2	-	237	118½	-	1:00	-	-	-
	M	40	10	2557¾	64	255¾	1:07	1:12	1:00	:12
	L	10	5	1238¼	123⅜	247½	1:14	2:15	1:08	1:07
OTHER	S	-	-	13	-	-	-	-	-	-
	M	2	-	33½	16¾	-	:04	-	-	-
	L	4	1	149¼	37⅓	149¼	1:00	1:07	:08	:15
5.	Line B.S.									
WORM	L (0-5 lb)	5	3	99½	20	33	3:02	3:03	:10	2:09
	M (6-15)	108	32	3961¼	36¾	123¾	1:00	2:02	:09	1:09
	H (16+)	-	-	-	-	-	-	-	-	-
DEAD										
BAIT	L	1	-	113	113	-	-	-	-	-
	M	67	23	4416½	66	192	1:08	2:03	1:01	1:02
	H	-	-	-	-	-	-	-	-	-
OTHER	L	2	-	27½	13¾	-	:04	-	-	-
	M	11	5	273¼	24¾	54¾	1:14	2:08	:12	1:12
	H	-	-	-	-	-	-	-	-	-

Table 7. Continued. Analysis of Tackle Features Vs Baits. 1980.

Bait	Feature	E	2+E	RH	RH/E	RH2	MEDIAN	UQ	LQ	IQR
6.	Weight									
WORM	N = Nil	17	9	331¼	19½	37	2:00	2:09	1:00	L:09
	L =(0-1 oz.)	58	9	2296	39½	255	1:00	1:10	:06	1:04
	H =(1 oz plus)	38	17	1433	37¼	84⅓	1:04	3:02	:11	2:07
DEAD										
BAIT	N	23	9	1576½	68½	175	1:14	2:01	1:06	:11
	L	30	11	1757½	58½	159¼	1:10	2:10	:14	1:12
	H	15	3	1195½	79¼	399	1:04	1:09	1:00	:09
OTHER	N	7	3	40½	5¼	13½	1:14	2:11	:10	2:01
	L	4	1	181¼	45⅓	181¼	:09	:10	:08	:02
	H	2	1	79	39½	79	1:11	1:13	1:09	:04
7.	Indicator									
WORM	In line sensor	30	5	730½	24⅓	146	:12	1:01	:08	:09
	Heron type	62	22	2656½	43	120¼	1:08	2:05	:10	1:11
	Grip type	1	-	20	20	-	-	-	-	-
	Bobbin	6	4	163¼	27¼	41	2:00	2:03	1:08	:11
	Other	14	4	490	35	122½	1:05	2:04	:10	1:10
DEAD										
BAIT	ILS	35	4	1948¼	55¼	487	1:04	1:08	:14	:10
	HT	25	13	2098	84	161½	2:00	2:10	1:09	1:01
	GT	-	-	32	-	-	-	-	-	-
	B	3	3	52¼	17½	17½	3:00	3:05	2:10	:11
	O	5	3	398½	79¼	132¼	2:12	3:02	1:14	1:04
OTHER	ILS	3	1	63¼	21	63¼	1:07	1:11	1:00	:11
	HT	1	-	150	150	-	-	-	-	-
	GT	-	-	-	-	-	-	-	-	-
	B	5	3	40	8	13⅓	2:06	3:00	1:14	1:02
	O	4	1	47½	11¾	47½	1:14	1:14	1:14	-

5. The effects of Bait Variables

5.1 Effect of Bait Position — Table 8.1

Based on the data in Table 8.1, it is impossible to draw significant conclusions due to the lack of effort with baits off the bottom as far as worm baits are concerned. For deadbaits, perhaps an indication of mid water baits being very successful with 3, 2+E at 38¾ RH/2 indicated, as against 20, 2+E at 220½ RH/2 on the bottom. There is certainly room for much more experiments on these lines.

5.2 Effects of Bait Addatives — Table 8.2

Without specifying the type of bait additives used, the data available is not enough to successfully draw any conclusions. It is hoped that more effort will also be put into this feature in 1981.

5.3 Effects of Groundbait — Table 8.3

Surprisingly, groundbaiting appears to have a detrimental effect with both worm and deadbait, with very significant differences in RH/E and RH/2 for RH/E, by a factor of 3 in both cases of bait and by a factor of 9 for deadbait RH/2. This is definately not an expected trend.

5.4 Effect of Prebaiting — Table 8.4

By direct contrast with the previous section, prebaiting when using worm bait increases your chances of 2+E by a factor of 5, with a RH/2 of 37½.

However for deadbaits, it appears that little success has been achieved.

Taking sections 5.3 and 5.4 together, for worm baits, prebaiting only reduces RH/2 to 37½ but groundbaiting during a session increased RH/2 to 132½. It really depends if you are fishing a single session or a series of consecutive sessions.

Table 8. Analysis of Bait Features Vs Baits. 1980.

Bait	Feature	E	2+E	RH	RH/E	RH2	MEDIAN	UQ	LQ	IQR
1.	Position									
WORM	Bottom	111	35	4030¼	36⅓	115	1:01	2:05	:10	1:11
	Mid-water	1	-	25	25	-	-	-	-	-
	Surface	1	-	5½	5½	-	-	-	-	-
DEAD BAIT	Bottom	65	20	4413¼	68	220½	1:08	2:03	1:01	1:02
	Mid-water	3	3	116¼	38¾	38¾	3:02	3:07	2:14	:09
	Surface	-	-	-	-	-	-	-	-	-
)THER	Bottom	13	5	300¾	23	60	1:07	2:06	:08	1:14
	Mid-water	-	-	-	-	-	-	-	-	-
	Surface	-	-	-	-	-	-	-	-	-
2.	Addatives									
WORM	YES	-	-	58	-	-	-	-	-	-
	NO	113	35	4002¾	35½	114½	1:02	2:05	:10	1:11
DEAD BAIT	YES	1	1	179	179	179	-	-	-	-
	NO	67	22	4350½	65	197¾	1:08	2:03	1:01	1:02
)THER	YES	-	-	-	-	-	-	-	-	-
	NO	13	5	300¾	23	60	1:07	2:06	:08	1:14
3.	Groundbait									
WORM	YES	33	16	2120	64¼	132½	1:14	3:02	1:00	2:02
	NO	80	19	1940¾	24¼	102	1:00	1:13	:08	1:05
DEAD BAIT	YES	7	1	1250	178½	1250	:14	1:08	:12	:12
	NO	61	22	3279½	53¾	149	1:10	2:04	1:04	1:00
THER	YES	6	3	145½	24¼	48½	2:04	3:00	1:06	1:10
	NO	7	2	155¼	22	77¾	:10	1:11	:06	1:05

Table 8. Continued; Analysis of Bait features Vs Baits. 1980.

Bait	Feature	E	2+E	RH	RH/E	RH2	MEDIAN	UQ	LQ	IQR
4.	Prebait									
WORM	YES	18	15	562¾	31¼	37½	3:02	3:07	2:05	1:02
	NO	95	20	3498	36¾	175	1:00	1:12	:08	1:04
DEAD BAIT	YES	1	-	493½	493½	-	-	-	-	-
	NO	67	23	4036	60¼	175½	1:08	2:03	1:01	1:02
OTHER	YES	4	2	28	7	14	2:07	3:00	1:14	1:02
	NO	9	3	272¾	30⅓	91	:10	2:00	:06	1:10

6. The Effect of Day or Night Table 9

Considering worm baits, worms during the day were more successful than at night with the following comparisons:

RH/2 (D) 99, (N) 135¾
RH/3 (D) 140¼ (N) 407
RH/4 (D) 841¾ (N) 1221½
also a higher UQ weight was achieved.

Considering deadbaits - the opposite is true:

RH/2 (D) 595 (N) 134
RH/3 (D) 1784¾ (N) 382½
RH/4 (D) NON CAUGHT (N) 2678¾
for comparison of worm Vs deadbait, day and night we see the following pattern

	Worm Day	D.B. Day	Worm Night	D.B. Night
RH/2	99	595	135¾	134
RH/3	140¼	1784¾	407	382½
RH/4	841¾	Nil	1221½	2678¾

Therefore we can obviously deduce that during the day, worms are very much more productive for size, but at night time, worm and deadbait are similar for 2+E and 3+E and only less so for 4+E.

Table 9. Analysis of the Effect of Light Vs Baits. 1980.

WEIGHT RANGE	WORM DAY	WORM NIGHT	D/BAIT DAY	D/BAIT NIGHT	O/DAY	O/NIGHT	OVERALL DAY	OVERALL NIGHT
0-1	18	29	4	7	3	3	25	39
1-2	5	26	8	26	-	2	13	54
2-3	5	12	2	13	-	3	7	28
3-4	10	4	1	6	-	2	11	12
4-5	2	2	-	1	-	-	2	3
Total E	40	73	15	53	3	10	58	136
Total RH	1683½	2443¼	1784¾	2678¾	128¼	172½	3596½	5294½
RH/E	42	33½	119	50½	42¾	17¼	62	39
RH/2	99	135¾	595	134	-	34½	179¾	123
RH/3	140¼	407	1784¾	382½	-	86¼	276½	353
RH/4	841¾	1221½	-	2678¾	-	-	1798¼	1764¾
MEDIAN	1:00	1:01	1:05	1:11	:04	1:11	1:00	1:07
UQ	3:02	1:15	1:08	2:04	:05	2:08	2:12	2:03
LQ	:10	:08	:15	1:04	:04	1:03	:10	:12
IQR	2:08	1:07	:09	1:00	:01	1:05	2:02	1:07

Conclusion

The summary (1.4) gives the overall successful angling variables and will not be reproduced here. The points to be made are:

a) This Report is as yet incomplete due to time constraints and Part II will be published as soon as possible - to include the effects of the variables of eel types, weather and water types, together with the analysis of individual waters.

b) This Report so far attempts to go further and answer more new questions than any since the 1970 Report. It is felt that at least 4 or 5 years similar analysis needs to be achieved and overall trends graphically represented before substantial significant results can be determined. It is to be hoped that members will conscientiously read and digest the data and comments contained in this Report and try to use them to better their eel angling standards.

Brian Crawford and Richard Baczyk. Spring 1981.

APPENDIX I

CONVENTIONS & ABBREVIATIONS

1. References are indicated by numbers in parenthesis, thus: (1), and are detailed in a collective list in Appendix V.

2. Weights are given in lb:oz, thus 4:7 (4lb 7oz) and are rounded to the nearest half oz.

3. Rod hours are generally rounded to the nearest quarter.

4. Rates-of-catch are referred to rod-hours per eel. (the higher the number the slower the rate-of-catch) and are rounded to two significant figures.

5. Ranges in weight etc., cover the range from the lower number to less than the upper number. Thus, for example, a 1:0 eel falls in the 1-2 lb range, a 2:0 eel in the 2-3 lb range, and so on.

6. Abbreviations used are:

E	eel(s)
N	number (usually, number of eels)
CF%	Cumulative frequency percent.
RH	rod hours.
RH/E	rod-hours per eel, the rate-of-catch of all eels in all weight range
RH2	rod-hours per 2lb plus eel, the rate-of-catch of eels weighing 2:0 and over; similarly for RH3, etc.
UQ	upper quartile.
LQ	lower quartile.
IQR	Inter-quartile range. If, for example, a number of weights is listed in order of magnitude, the MEDIAN is the middle weight which divides the list in half, and the QUARTILES are the weights which divide each half into two equal parts. The median is therefor a measure of the average and the interquartile range is a measure of spread.
S	Number of sessions fished.
No. Rep	Number of members reporting sessions fished.
E/DB	Eels captured on deadbait.
E/W	Eels captured on worm bait.
EDB/D	Eels captured on deadbait during the day.
EDB/N	Eels captured on deadbait during the night.
EW/D	Eels captured on wormbait during the day.
EW/N	Eels captured on wormbait during the night.
E/O	Eels captured on baits other than worm or deadbait.
EO/D	Eels captured on baits other than worm or deadbait during the day.
EO/N	Eels captured on baits other than worm or deadbait during the night.
RH/W	Rod hours fished using worm bait.
RH/DB	Rod hours fished using deadbaits.
T	Total
2+E	Number of eels of a weight over 2lb.
Mean	Average number.

T.M. Coulson and B. Crawford.

APPENDIX II

SIGNIFICANCE TESTS

T.M. Coulson.

In the Bulletin article on the effects of moonlight (15), members were introduced to the application of tests of statistical significance to angling data, and some may have wondered why such tests have not been applied more widely to the data in these reports.

These are, in fact, several reasons for having deferred significance testing, one of the main ones being that a fair amount of calculation is involved and in the writer's view it has been worth waiting until there was some chance of the results of such tests being of real value. That time is now here.

For non-mathematical members who may not be familiar with the concept, the following introductory notes may help to explain the general idea.

It is necessary first to have a clear idea of the sense in which the word "probability" is used in statistics. Referring probability to a percentage scale, its meaning can be illustrated by saying that the probability of getting heads on the spin of an unbiassed coin is 50%. That is, if we spin the coin a large number of times, the number of heads will tend towards half of the total spins. Obviously, the probability of spinning tails is also 50%. Similarly, the probability of getting a six on a single throw of an unbiassed dice is one sixth or approximately 17%. And so on.

An event which is certain to occur is said to have a probability of 100% and one which cannot possibly occur at all is said to have a probability of 0%. In the statistical sense, then, probability is a numerical scale of likelihood ranging all the way from certainty to impossibility.

The idea of significance testing can again be illustrated by a coin-spinning example. Suppose we spin a real-life coin 100 times. We shall expect to get roughly - but not exactly - 50 heads and 50 tails. Suppose we actually get 45 heads and 55 tails. We may now ask the question: is the difference between what we expected and what we got significant? In other words, might the result have arisen by chance with a perfectly good coin, or are we justified in concluding that the coin was biassed, with a small but real built-in predisposition towards coming down tails?

Surprising as it may seem, it is possible to calculate a factual answer to this question. It is possible to calculate how often a difference as large as 45-55 would occur with a truly unbiassed coin in a long series of 100-spin trials. The calculation shows that differences as large as 45-55 would occur in about half of our long series of 100-spin trials. In other words, the result we actually observed has a 50% probability of occurring even with a truly unbiassed coin, and most people would agree that this provides no good reason for doubting that the coin we actually tested was a "good" one. Or, putting it another way, the result of our test was statistically "not significance".

Obviously, the calculation referred to takes into account not merely the proportion 45-55, but also the actual number of spins on which the evidence is based. For example, if we got 270 heads and 330 tails in a 600-spin trial, the proportions are still 45-55, but the calculation shows that there is only about a 1% probability of such a result occurring with a "good" coin. Most people would agree that this gives reasonable grounds for entertaining serious doubts about the coin - i.e. the result is statistically "significant".

Taking the illustration a step further, if we carried out a 1,000-spin trial and got 450 heads and 550 tails, the proportions would still be 45-55 but the probability of this result occurring by chance is only about 0.1%. Statistically, this result is "highly significant". In a manner of speaking, we could declare the coin to be a dud and add that we were 99.9% sure of it.

A variety of such tests of significance is possible, all taking the basic of considering the difference between the actual results observed and the results which would have been expected, and calculating the probability of such a difference having arisen by chance. Members interested in the methods of doing such calculations may look them up in the statistics textbooks but a few further comments are worth making here.

In the coin-spinning illustration above, we were testing the notion that a coin might be biassed by considering how the result of spinning it differed from the result expected for an unbiassed coin. In other words, we compare the result with what is called the "Null Hypothesis" and in the coin example, the consequence of the Null Hypothesis (namely, that the coin is <u>not</u> biassed) is self-evident: obviously, the "expected" result on the Null Hypothesis is 50-50. In other cases, the expectation arising from the Null Hypothesis may require some thought. In an angling example, suppose 45 eels are caught on worms and 55 eels on dead-baits, and we want to know whether the result indicates a significant difference in prospects using these two baits. In this case, the "expected" result is no longer self-evident. At the very least, we shall have to take into account the amount of time spent fishing the two baits. If it was about equal, the expected result would be 50-50; but if we had spent about twice as long on dead-baits as on worms, other things being equal, we would "expect" twice as many eels on deadbaits i.e. about 17-33. In other words, we must take the time factor into account when we set up our "expected" results for the purpose of a significance test.

In general, we should beware jumping to conclusions about the angling meanings of our calculations. The point about a significance test is that, unless there are reasonable grounds for thinking that a real difference existed (and not a fortuitous difference which arose by chance) there is little point in looking for explanations. The time to look for explanations is when we are reasonably sure that there really is some effect to be explained! However, the explanation may not be the obvious one; for example, if we find a significant difference between some worm and deadbait results, we shall be wise to consider whether they were obtained from the same waters, during the same times of day, in the same periods of the season, etc., and if not whether these other variables are likely to have cancelled one another out. A significance test will therefore often lead on to other investigations, as we try to trace the significance back to its source.

Finally, it is conventional in statistics to describe as "probably significant" a result which could have arisen by chance in only about 5% of cases; as "significant" a result at the 1% level, and as "highly significant" a result at the 0.1% level. These criteria have been developed from the long experience of statisticians in many fields, but it is acknowledged that significance does depend to some extent on the field of study. In the present Report, however, the conventional criteria are used, and results above the 5% level are regarded as "not significant". These are quite severe criteria, and it may well be that anglers would be content to base their tactics on conclusions at (say) 10% or even 20% significance. Indeed, it is quite unprecedented for anglers to be given the slightest notion of the significance of the advice they are offered. In any case, it will be appreciated that "not significant" in this context is equivalent to a verdict of "not proven" in many instances i.e. the significance test shows us that

more evidence is needed to settle the matter. Equally, in cases where a great weight of evidence already exists, an effect might prove to be statistically significant yet of such small magnitude as to be of no practical angling significance. Like other statistical methods, significance testing is only a tool, and like all tools it needs to be used skilfully and thoughtfully.

APPENDIX III T.M. Coulson

THE USE OF "ROD-HOURS" AS A MEASURE OF "ANGLING EFFORT"

Good anglers are necessarily practical men, accustomed to trying out ideas in practice before accepting or rejecting them. For instance, no angler would accpet that such-and-such a bait is good for the fish he is after without knowing whether it had been tried and the fish duly caught. Moreover, knowing that something has happened once or a few times is not enough, because almost anything can happen on rare occasions. The angler is therefore interested not merely in strategies and tactics which give him a chance, he is interested in trying to choose the strategies and tactics which give him a better chance than others. In other words, anglers are accustomed to trying to compare the merits of different methods, etc., in practice before accepting or rejecting them.

It is common experiences that even the simplest and most straightforward attempts to assess the comparative merits of different methods, etc., can be extremely difficult to bring successfully to a convincing conclusion. One of the most common problems in these attempted comparisons lies in trying to give the various items of one's experience the right relative balance or "weight". To give an absurdly simple example, an angler who recalls that he has never caught any eels during the daytime should obviously give a very different weight to his observation if, on the one hand, he has fished for eels regularly during the day; or, on the other hand, has seldom started before dusk or carried on after dawn!

In short, it is necessary to try to take into account not only the results obtained, but the angling effort which went into obtaining them. All anglers try to do this, if only on a very rough and subjective basis; and the more successful they are at weighing off the element of effort, the more valid their conclusions are likely to be. Of course, angling effort is a complex thing, no doubt impossible to measure exactly. However, the writer suggested some years ago (see, for example ref. (5.19)) that even a very rough measure of angling effort would be a very valuable aid to making more objective comparisons, and that perhaps "rod-hours" might be useful units to employ. It seemed to the writer that rod-hours were likely to be more useful than, for example, fishing hours, number of sessions, number of members in the club, etc., and at least as likely to be useful as some of the measures of fishing effort (e.g. the horsepower of trawlers!) which have proved useful in zoological studies. A scheme was proposed in which, inter alia, the utility of rod-hours would be investigated in a wide variety of comparisons. The present series of Reports relate to that scheme and contain a multitude of comparisons based on rod-hours.

Since the original proposal, it has been suggested in the angling press (e.g. ref (20)) and elsewhere that the entire concept of using rod-hours in this way as measures of angling effort was absurd. However, in the writer's opinion, the matter is not one which can be settled like a political issue by argument, however forceful; nor yet like a geometry theorem by the application of pure logic. It is essentially a practical question and, like angling problems, it can only be settled by putting the method to the test and finding out whether it gives useful results, or not.

In any case, and part from any outside controversy, the investigation has now reached a stage where it is appropriate to try to decide whether or not the comparisons made in these Reports on the rod-hour basis are valid. Some comparisons lead to conclusions which agree with our preconceptions, and we

have no difficulty in accepting them; but other conclusions are more or less unexpected, and it is important to know whether these unexpected conclusions are to be taken seriously.

In fact, the present Report provides many convincing illustrations that rod-hours do indeed provide a valid and useful measure. It is proposed to show the line of argument in one case; the reader will have no difficulty in finding many other parallel cases.

Let us start by adopting the "Null Hypothesis" that the critics are right and that rod-hours have no value for our purpose. That is to say that rod-hours are not related to results in any meaningful way; or we might say that the relation between rod-hours and results is random.

A consequence of this Null Hypothesis would be that when we convert results into rates-of-catch by dividing numbers of eels caught into the number of rod-hours involved, we are carrying out a meaningless exercise. We might equally well use a set of random numbers instead of the number of rod-hours recorded on the Session Reports. If this were so, then any patterns which seemed to emerge would be fortuitous; they would not be repeated consistently; and most important, they would generally fail strict tests of statistical significance.

It follows therefore that if we find more or less consistent patterns emerging repeatedly, and especially if these patterns differ sufficiently from the random expectation to be statisically significant, then we have excellent objective grounds for rejecting the Null Hypothesis and concluding that the critics were mistaken.

Consider first the case outlined in Section 3.1 of this Report, in which ratios of rates-of-catch between worms and deadbaits are taken. Rod-hours are well and truly compounded into these ratios, and it is improbable that any sort of rational result would emerge if the Null Hypothesis were true. In fact, we find firstly that worms catch eels between two and three times faster than deadbaits; a reasonable conclusion which accords well with common experience. We find, moreover, that we get about the same result in each of the four years taken separately. Even more strikingly, we find roughly the same rather complex pattern through the various weight ranges in each of the four years.

Doubtless, the unbiassed reader will have great difficulty in accepting the notion that rod-hours are meaningless and unrelated to results in the face of these consistently repeated patterns. It is difficult to imagine how these patterns could emerge unless (a) they existed in the records of members' angling experiences and (b) the analytical methods which revealed them are valid.

Taking the argument a stage further, all individual waters which had produced even one single eel on both worms and deadbaits were considered, and ratios calculated for all of them. There are no less than forty. We find that the average ratio for these 40 waters also lies between two and three, and we note in passing that there is no particular reason why this average should tally with the total pooled results, unless it represents a fundamental fact of angling life laid bare by a valid method of analysis.

We may now apply the most searching test of all. If the Null Hypothesis of the critics is correct, and the rates-of-catch are meaningless and random, then we are merely taking the ratios of pairs of random numbers which are as likely to be below 1 as above 1, and the fact that the average ratio is 2.81 instead of 1.00 is fortuitous. Knowing as we do how the 40 ratios vary above and below their average of 2.81, we can in fact calculate exactly what the chance is of the difference from the random result of 1.00 arising fortuitously.

The calculation shows that the chance is almost immeasurably small, very much less than one chance in a thousand.

The reader will find many similar cases in other sections of the Report, and in the writer's view they demonstrate conclusively that the rod-hour has proved to be an entirely useful unit with which to take an approximate measure of angling effort for the purpose of the type of comparison made. It is therefore reasonable to conclude that, on the one hand, the suggestion that rod-hours are meaningless is wrong; and on the other, that we shall be wise to give due weight to unexpected results as well as expected ones.

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