

**II. IRISH KELT TAGGING EXPERIMENTS  
1961/62 TO 1966/67.**

*By*

**A. E. J. WENT**

Since the beginning of the century large numbers of salmon kelts have been tagged in Irish waters and the results have been given in a series of papers by Holt (1903), Hillas (1906), Went (1947, 1957 and 1964), Went and Gibson (1953) and Piggins (1961). As, however, the results up to the end of 1962 have been summarised in Went (1964) references need not be made to the previous papers. A considerable number of kelts have been tagged since 1962 at a number of stations in Ireland and they form the basis of this paper. Reference will also be made to the results obtained by the Salmon Research Trust of Ireland, Inc. at its installations on the Burrishoole River, Co. Mayo and given in the Trust's *Annual Reports* for the years 1962 to 1967, inclusive.

For the bulk of the taggings referred to in this paper Lea Hydrostatic tags (see Went, 1951 for description) were used. These were made in Ireland from components obtained in Denmark. The tags were fixed by a single wire and there is some evidence that a proportion were shed. More recently a double wire technique has been adopted but not for the recaptures described in this paper.

From the spring of 1962 to the late spring of 1967 salmon kelts were tagged at centres on the Rivers Nore (Inistioge), Blackwater (Banteer and Lismore), Lee (Carrigadrohid), Shannon (Parteen), Corrib (Cong and Galway), Screebe, Moy, Ballisodare and Owenea (Glenties). In addition some salmon were tagged, just in advance of spawning, on Carrowmore Lake in Co. Mayo, on a tributary of the Owenmore River. Although the fish in question had not spawned when they were tagged, they may be conveniently considered here because the only recaptures were made of fish which had survived the spawning immediately after their tagging.

The numbers of fish tagged are given in Table 1. The results of these tagging experiments were as follows:—

#### 1. RIVER ERNE.

Number tagged = 10,041

Recoveries :—Still as kelts,	41 (0.41%)
As clean fish or after second spawning,	209 (2.08%)
Tag only,	27 (0.27%)
Total	277 (2.76%)

All but one of the clean fish had spent less than a full year recovering in the sea, i.e. had adopted the short absence habit. The remaining fish had adopted the very long absence habit, i.e. had spent more than a full year recovering in the sea. The average length of the first group when tagged was 62 cm and at recapture 68 cm. As the original weight was in many cases only estimated it is best to use an estimated "kelt weight" at tagging derived from a condition coefficient of 0.8 on Menzies scale (Menzies, 1921) and a condition coefficient of 1.1 for clean fish on recapture. On this basis the estimated average weight of the kelt would be 1.7 kg and of the clean fish derived therefrom 3.5 kg.

The growth increment in the fish which spent less than a full year recovering in the sea was comparatively small, but this is not surprising since the period between tagging and recovery as clean fish in tidal waters (which may be much more than the actual period spent recovering in the sea) varied from 61 to 183 days, with an average of 105 days. The period of absence of the clean fish of this category taken in the sea or the tidal waters of the various rivers was as follows:—

<i>Absence in days</i>	<i>Number</i>	<i>Percentage</i>
60 — 69	4	3.4
70 — 79	6	5.1
80 — 89	21	17.8
90 — 99	22	18.7
100 — 109	23	19.5
110 — 119	20	16.9
120 — 129	11	9.3
130 and above	11	9.3
TOTAL	118	100.0

The growth increment of the one fish which had adopted the very long absence habit was much higher, as can be seen in the following data:—

At tagging:—	61 cm	and 1.8 kg.
At recapture:—	80 cm	and 5.3 kg.

Details of the place of recapture of seven fish were not recorded. Of the others 146 (72%) were recaptured in the estuary of the River Erne or in its fresh waters and 56 (28%) were recaptured outside the Erne system. These were, of course, the most interesting recaptures and in this series of tagging experiments comprised a much higher proportion than normal. These places of recapture, arranged as far as the Irish coast is concerned from south to north, were as follows:—

	<i>Place</i>	<i>Number of recaptures</i>
Co. Mayo	Blacksod Bay	1
	Portacloy	1
	Porturlin	1
	Lacken Bay	1
	Killala Bay	1
	River Moy (Estuary and Fresh waters)	5
Co. Sligo	Enniscrone	3
	Easkey	1
	Aughris Head	1

	<i>Place</i>	<i>Number of recaptures</i>
Co. Donegal	Lough Melvin (Fresh water)	1
	Inver Bay	1
	St. John's Point	3
	Fintragh Bay	2
	River Owenea (Fresh water)	2
	Burtonport	1
	Off Aranmore	7
	Gola Island	1
	Off Bloody Foreland	1
	Off Tory Island and in Tory Sound	11
	Horn Head	1
	Downings Bay	3
	Off Fanad Head	4
	River Lennon	1
	Haverford West, South Wales	1
	Between Trondheim and Namsos in Norway	1

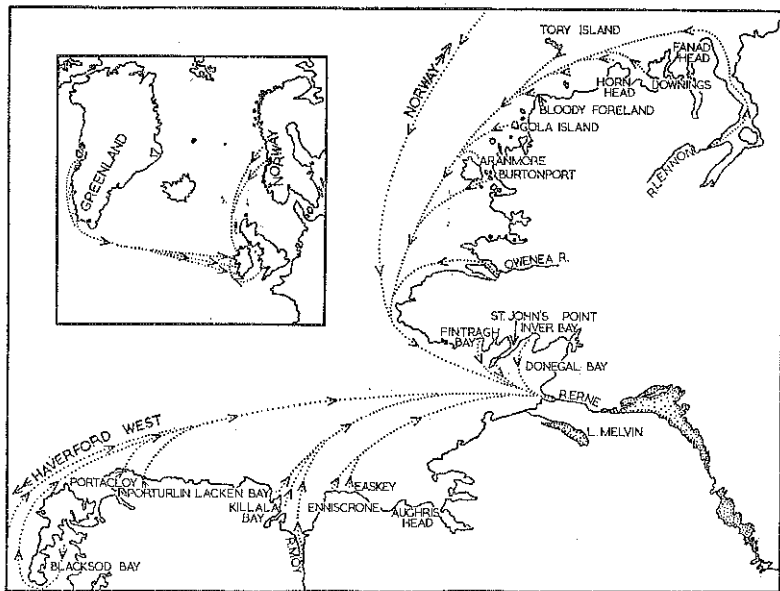


Fig. 1. Distribution of recapture of kelts tagged in the River Erne (for convenience arrows are shown directed towards the tagging station) with inset indicating long distant (400 miles and upwards) recaptures of fish described in this paper.

These localities have been indicated in a sketch map in Fig. 1.

One can conclude from this distribution that returning previous spawned fish may move to the Erne from both the north and south and that they are subjected to recapture by a variety of nets over a fairly long stretch of coastline. The recovery of the fish off the Norwegian coast is interesting because this is the first Irish tagged salmon to be recovered from that country. The fish recovered off the Norwegian coast was tagged on 3 May, 1963 and was found dead on 12 April, 1965. Unfortunately no other details of the fish are known. It had travelled a minimum distance of 1640 km from the tagging station.

Recoveries of tags only were made over a very wide area. Eleven tags were recovered in the estuary of the River Erne, four at Ross-nowlagh near the mouth of the river, six elsewhere in Donegal Bay, one each at Glencolumkille, Narin and Portnablagh further along the Donegal coast and one in Blacksod Bay. Other more distant recoveries were made near Tralee, at Portrush, at four places along the Welsh coast—near Merioneth, at Newgate Beach, Pembrokeshire, at Dina's Dingle Beach and near Harlech—and one each off Dunnet Head in the North of Scotland and in Loch Brittle on the Isle of Skye.

As mentioned earlier, 70% of the returning previous spawners found their way back to the river where they first spawned, i.e. the River Erne. Of those taken outside the River Erne 7 had found their way into the freshwater portion of "foreign" waters, namely the Rivers Moy (3), Owenea (2) and Lennon (1) and one went to Lough Melvin which is drained by the Drowse River. This is a much higher percentage than has been observed in previous experiments (Went, 1964).

## 2. RIVER BLACKWATER.

Number tagged = 1,386

Recoveries:—Still as kelts	5	0.36%
As clean fish	10	0.72%
Tags only	3	0.22%
Total	18	1.30%

Five of the fish had adopted the short, four the long and one the very long "absence" habit. The interval between tagging and recapture was 192 to 250 days, 399 to 450 days and 555 days, respectively, for fish adopting the short, long and very long absence habit. In the case of this river the date of tagging was probably very much earlier than the actual date upon which the fish reached the sea. The interval for short absence fish was, therefore, somewhat shorter than mentioned above but, because spawning takes place in the Blackwater earlier than in the River Erne, it is likely that the kelts would regain the sea earlier than those of the River Erne. The relative weights at tagging and recapture were as follows:—

At tagging:—58 cm and 1.6 kg.

At recapture:—76 cm and 4.8 kg.

All the fish were recaptured, and all but one of the tags were recovered, in the Blackwater or its estuary.

### 3. RIVER SHANNON.

Number tagged = 1328

Recoveries:—Still as kelts	25	1.88%
As clean fish	8	0.60%
Tag only	1	0.08%
Total	34	2.56%

Of all the recaptures made from this station the most important were two from Greenland as follows:—

Tagging details			Recapture details				
Date	Weight (kg)	Length (cm)	Date	Weight (kg)	Length (cm)	Days at Liberty	
6/1/65	1.8	60	Fredrikshab 62°05'N, 49°35'W.	13/9/65	4.0	69	250
12/1/66	2.5	65	Arsuk 61°10'N, 48°33'W.	20/8/66	3.75	75	220

These two fish would have adopted the long or very long absence habit but the remaining six fish recaptured as clean fish adopted the short absence habit. The weights and lengths at tagging and recapture of these fish were as follows:—

At tagging:— 2.3 kg and 62 cm

At recapture:—4.1 kg and 74 cm

The remaining recoveries were made in the Shannon itself.

### 4. RIVER OWENEA.

Number = 1164

Recoveries:—Still as kelts	39	3.35%
As clean fish	37	3.18%
Tags only	25	2.15%
Total	101	8.68%

Although the proportion of tags only is high this is because during the years in question a large number of tags from clean fish were sent without details of the fish themselves. Most of the returns of tags only were from clean fish which had survived spawning, returned to the sea and returned to the sea to recover therefrom and returned on a subsequent occasion to the river. Of the clean fish for which details were supplied recoveries were made outside the Owenea River as follows:—

Off Aranmore Lighthouse	1
Off Teelin and Kilcar	5
In Donegal Bay (Dunkineely, Killybegs, etc.)	3

These localities have been indicated in Fig 2.

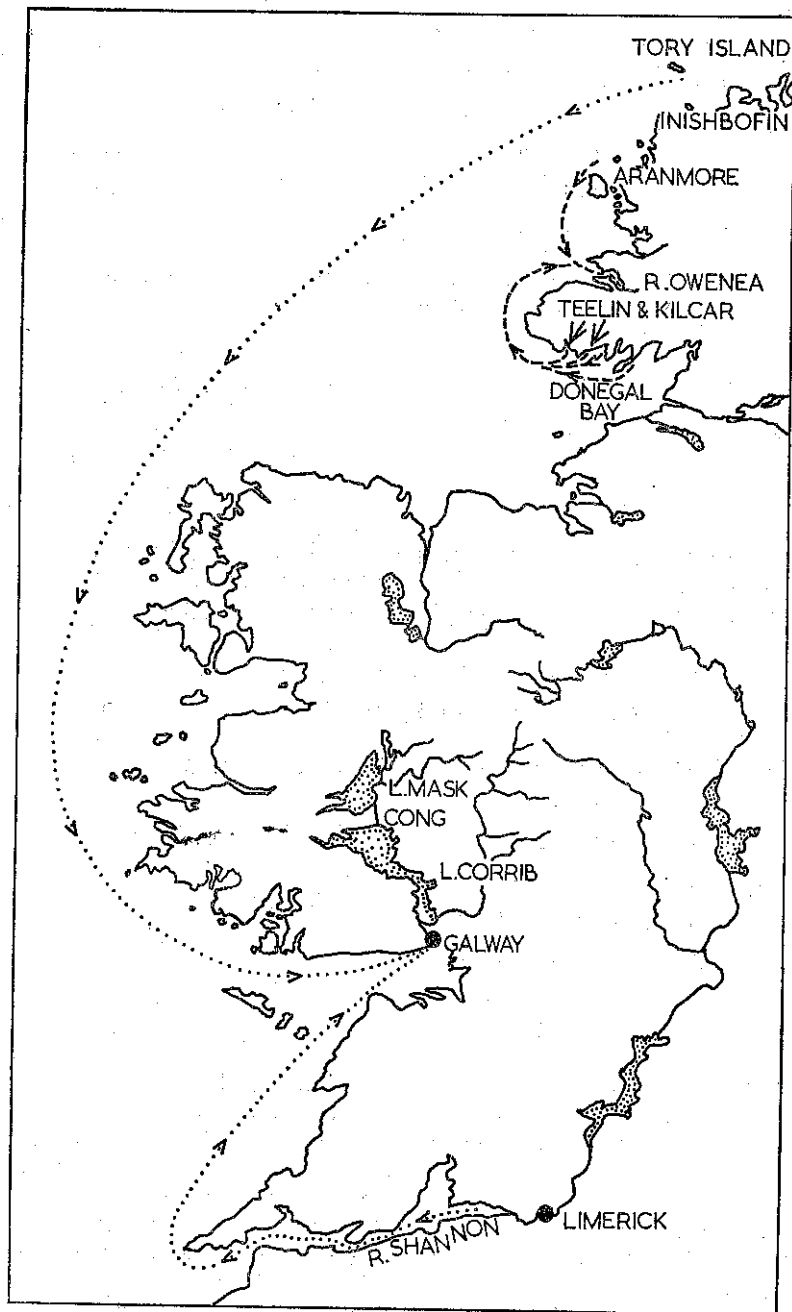


Fig. 2. Sketch map showing coastal recaptures from kelt taggings in the Rivers Owenea and Corrib. [Broken line for River Owenea and dotted line for River Corrib].

Twenty-six (74%) of the fish adopted the short absence habit and nine (26%) the long or very long absence habit. The change in weight and length in the two groups was as follows:—

Short absence fish

At tagging:— 2.3 kg and 65 cm

At recapture:—3.8 kg and 72 cm

Long and very long absence fish

At tagging:— 2.8 kg and 63 cm

At recapture:—4.8 kg and 79 cm

In the case of the short absence fish taken in the sea or the estuary of the Owenea the period between tagging and recapture ranged from 133 to 192 days (mean 156 days), whereas in those fish which had adopted the long or very long absence habit the period varied from 431 to 502 days (mean=473).

## 5. RIVER CORRIB.

Kelts were tagged during the period in question at Cong on the Cong River flowing into Lough Corrib and at Galway near the mouth of the river. The taggings at these two places have been combined for the most part in what follows:—

Number tagged = 587

Recoveries:—Still as kelts	29	5.0%
As clean fish	24*	4.1%
Tags only	2	0.3%
Total	54	9.4%

\*including one double recapture.

Of the clean fish all but three were recaptured in the Corrib system. The three exceptions were fish taken between Inishbofin and Tory Island along the Donegal coast, off Green's Island in the estuary of the River Shannon and in Greenland. These localities have been indicated in Fig. 2. All but one of the fish had exhibited the short absence habit. With these fish the period between tagging and recapture ranged from 75 to 251 days (mean=126 days). The single fish adopting the very long absence habit was at liberty for 458 days between tagging and recapture. The short absence fish showed the following increases in weight and length:—

At tagging:— 2.0 kg and 62 cm

At recapture:—3.4 kg and 72 cm

The fish adopting the very long absence habit was 1.8 kg and 61 cm at tagging and 5.7 kg and 83 cm at recapture. The fish which was



recaptured twice after spawning in successive years had weights and lengths at tagging and recapture as follows:—

On 1 /4/66	2.3 kg and 60 cm	as kelt;
On 8/12/66	2.7 kg and 66 cm	as kelt for second time;
On 8/ 7/67	4.1 kg and 72 cm	as clean fish.

This was recaptured in December 1966 in the trap in the Cong River where it had been originally captured for artificial propagation at the end of the previous year. It had, therefore, returned for spawning on the second occasion to the same tributary as on the first occasion.

The details of the Greenland recapture were as follows:—

Date	Weight (kg)	Length (cm)	Date	Weight (kg)	Length (cm)	Place
22/3/65	2.3	69	16/10/65	7.6	82	Egedesminde district Akunak 68°43'N, 52°12'W.

For the sake of convenience, as stated, the taggings at the two places on the Corrib system have been considered together, but some interesting information is available as a result of the Cong taggings. In the case of the fish tagged at Cong seven fish were recaptured as kelts before they regained the sea. Two of these were recaptured at Galway 49 and 71 days respectively, after release into the Cong River which drains into the northern shore of Lough Corrib. Other kelts were recaptured in Lough Corrib itself 6, 14 and 36 days after release. One other fish was recaptured in the Cong River itself 17 days after release. Kelts, therefore, may take a considerable time to regain the sea after spawning in the upper waters of a system such as that of the Corrib.

#### 6. RIVER LEE.

Number tagged = 239

Recoveries:—Still as kelts	9	3.8%
As clean fish	2	0.8%
Total	11	4.6%

One of the clean fish had exhibited the short absence habit and the other either the long or very long absence habit. No details were available of the weights and lengths at recapture but both fish were retaken in the Lee system.

#### 7. BALLISODARE RIVER.

Number tagged = 135

Recoveries:—As clean fish	3	2.2%
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One of these fish adopted the short absence, one the long absence and one the very long absence habit. The details were as follows:—

Absence habit	At tagging			At recapture			Days at liberty
	Date	Weight (kg)	Length (cm)	Date	Weight (kg)	Length (cm)	
Short (less than a full year)	10/3/62	1.4	57	10/9/62	2.8	63	184
Long (a full year)	10/2/61	1.8	62	19/5/62	5.6	81	451
Very long (more than a full year)	10/2/61	1.5	60	6/7/62	4.9	78	463

The first two fish were recaptured at Ballisodare but the third fish was retaken in the estuary of the River Moy. Reference has already been made to a similar phenomenon in recent years (Went, 1964). This brings the total of previous spawners tagged at Ballisodare and recaptured in the estuary of the River Moy to five. Four other fish tagged were recaptured in the estuary of the River Moy still as kelts (Went, 1964) which indicates that after regaining the sea some of the spent fish move westwards along the coast of what might be called for want of a better term greater Donegal Bay.

#### 8. CARROWMORE LAKE.

In connection with experiments to ascertain the stock of salmon in Carrowmore Lake a total of 117 salmon were tagged and released in the autumn of the years 1961 to 1964 inclusive. The fish in question were filling, i.e. they would have spawned at the end of the year in which they were tagged. Strictly they were not kelts but since the only recaptures which could have been expected were after the fish had spawned they may for the purposes of this paper be so regarded. Three recaptures only were made. One of the fish was recaptured as a clean fish in the year following tagging in the tidal rivers of the combined estuary of the Owenmore and Owenduff Rivers. This fish, originally 71 cm in length, weighed 4.5 kg and had a length of 76 cm at capture. The remaining two recaptures were very interesting as the fish in question were retaken in Greenland. The details are as follows:—

Tagging details			Recapture details			Place
Date	Estimated Weight (kg)	Length (cm)	Date	Estimated Weight (kg)	Length (cm)	
5/9/63	5.8	80	6/10/64	8.0	90	Julianchaab 60°40'N, 46°15'W.
12/9/63	4.7	74	21/10/64	6.2	89	Sukkertoppen 65°25'N, 53°00'W.

These recaptures have already been reported in Went, 1966.

#### 9. SCREEBE RIVER.

Number tagged = 107

Recoveries:—As clean fish	2	1.7%
Tag only	1	0.9%
Total	3	2.8%

Two of these fish were recovered during hatchery operations the year following tagging and a tag was recovered in Camus Bay into which the Screebe River debouches.

#### 10. RIVER NORE.

Number tagged = 89

Recoveries:—Still as kelts	4	4.6%
As clean fish	1	1.15%
Tag only	1	1.15%
Total	6	6.9%

The sole clean fish recaptured was retaken in the River Nore itself 158 days after tagging. The original weight and length was 3.3 kg and 74 cm and after the second recapture the relevant details were 4.5 kg and 81 cm.

#### 11. RIVER MOY.

Number tagged = 59.

Recoveries—As clean fish only	3	5.1%
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The three recoveries were made in the estuary of the River Moy 115, 163 and 434 days after liberation. The average weights and lengths at release and recapture for those fish exhibiting the short absence habit were 1.8 kg; 61 cm; 3.3 kg; 66 cm and for the fish adopting the very long absence habit 61 cm (no weight) and 5.2 kg and 76 cm.

### GENERAL DISCUSSION

Excluding the Carrowmore River fish a total of 292 fish tagged as kelts in these experiments were recovered as clean fish in known localities. Of these 222 (76.0%) were retaken in the estuary or freshwater portion of the river where they were originally tagged, 63 (21.6%) were retaken in the open sea or tidal waters of other rivers and 7 (2.4%) in the freshwater portion of a river, other than that where the fish were released. Again these experiments show that the previous spawners have a marked "homing instinct" for the river where they were first spawned. Whilst the proportion of fish returning to the freshwater portion of a "foreign" river was somewhat higher than reported earlier (Went, 1964), it is still quite small. All these "foreign" recaptures were made from fish tagged in the River Erne, which is harnessed for hydro-electrical purposes and this may explain partly why the fish ascended, as previous spawners, rivers other than the Erne.

The results of these experiments as far as the Donegal rivers are concerned are similar to those obtained previously (Went, 1964) in that recaptures of the returning tagged previous spawners were made

along the north-west coast of Ireland both north and south of the Rivers Erne and Owenea where fish had been tagged originally. Two fish tagged in the Corrib system were recovered off the Donegal coast and from the River Shannon, so a similar state of affairs occurs along the Galway coast.

In these experiments a total of 14,881 kelts were tagged and 296 recoveries were made of clean fish after a period of feeding in the sea. In addition 152 fish still as kelts and 60 tags only were recovered. The percentage of clean fish was, therefore, 1.99 with a range for the different rivers from 5.1% (Moy) for a very limited experiment, 3.18% for the River Owenea to 0.6% for the River Shannon. These figures are somewhat lower than those obtained earlier (Went, 1964) when the recoveries amounted to 2.36% of the fish tagged. Even if one includes the returns of tags only since a high proportion were from clean fish the percentage recovery would only be 2.39%. This figure is very much below that recorded by the Salmon Research Trust of Ireland, Inc. in its *Annual Reports* for the period from 1951 to 1967. A total of 116 recoveries were made from 1167 taggings or a percentage of 10. Even this figure is a minimum since the Trust has had heretofore only control over one of the two freshwater discharges on the Burrishoole River system.

Although kelt tagging gives a relatively small return for the effort expended, in the case of the Irish rivers in question it is worthwhile since a considerable amount of information has been obtained, in particular, on possible movements and recoveries in Greenland.

So far seven recaptures in Greenland have been recorded of fish tagged in Ireland, two from the Carrowmore taggings in 1963, two from the Shannon taggings in 1965 and 1966, and one from the Corrib taggings of 1965, as reported in this paper and two from the recoveries from taggings in the Burrishoole River system carried out by the Salmon Research Trust of Ireland, Inc. in the year 1964 (Went, 1966).

The long distance recaptures—i.e. recaptures made more than 400 miles from the tagging station have been indicated in the inset in Fig. 1, which includes a late recapture from the Erne taggings off the Norwegian coast not reported elsewhere.

### RESUME

1. A total of 14,881 kelts were tagged on ten Irish river systems in the years 1962 to 1967 together with small numbers of fish immediately before spawning in Carrowmore Lake in Co. Mayo.
2. A total of 296 clean tagged fish were recovered. Of these 76.0% were recovered in the river or the estuary of the river where tagging had been carried on, 21.6% in the open sea or the tidal waters of the rivers and only 2.4% in the freshwater portion of a river other than that where tagging was carried on.

3. Recoveries in the open sea or in the tidal waters of "foreign" rivers are indicated for the Rivers Erne, Owenea and Corrib in Figs. 1 and 2.
4. Recaptures of five fish tagged either as kelts or immediately before spawning in Irish waters as feeding fish in the Greenlandic area are reported. These fish were originally tagged in the Rivers Shannon and Corrib and in Carrowmore Lake.

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Table 1: Details of numbers of kelts tagged in the various centres in the years 1961/62 to 1966/67.

River	Years						Total
	1961/2	1962/3	1963/4	1964/5	1965/6	1966/7	
Nore	28	17	31	11	—	—	87
Blackwater	402	536	206	242	—	—	1386
Lee	—	51	31	94	63	—	239
Shannon	169	100	355	230	231	243	1328
Corrib	—	—	8	274	84	114	480
Screebe	—	—	—	50	57	—	107
Moy	12	32	15	—	—	—	59
Ballisodare	38	38	41	18	—	—	135
Erne	734	1557	792	1910	2366	2682	10041
Owenea	305	145	83	251	181	199	1164
Carrowmore Lake	5	15	15	82	—	—	117
<b>TOTAL</b>	1693	2491	1577	3162	2982	3238	15143