

International Council for
the Exploration of the Sea

Anadromous and Catadromous
Fish Committee

Diet and development of eels in Ireland

by

Christopher Moriarty

Department of Agriculture and Fisheries, Dublin, Ireland.



A number of studies of the food of eels have been made (Deelder 1971). They have most frequently revealed an invertebrate diet for eels of less than about 50 cm length while larger individuals consume an increasing quantity of fish. Since 1965, when a survey of eels in Ireland caught by fyke net began, detailed records have been kept of the food of eels from various waters.

Full information on the stomach contents of these eels has been published or is in the course of publication (Moriarty 1972, 1973). In this paper the feeding regimes of eels from different waters is compared and tentative conclusions are drawn on the effect of various diets on the rate of growth and age at maturity.

Tables 1 and 2 show age and length distributions. Long line fishing, believed to be intensive, takes place in Lough Gill and Lough Inchiquin and to a smaller degree in Lough Corrib and the Erne lakes. No fishing for immature eels had taken place in the South Sloblands and the River Blackwater at the time of sampling. Fishing for eels is prohibited in Lough Derg and Lough Key. Therefore the South Sloblands and River Blackwater represent completely natural stocks and the disappearance of old eels presumably results from their attaining sexual maturity.

Lough Derg and Southern Lough Corrib were both the nearest lakes to the sea on their river systems and the small numbers of old eels must be attributed to upstream migration as well as to departure at maturity. Table 3 shows calculated mean lengths of the eels at 10 and 15 years respectively. It will be seen that the growth rates of all were similar with the exception of the population in the Erne Lakes. There the eels grew very much faster.

It appears that in three of the waters under consideration the age at maturity can be deduced from the age distributions since it seems unlikely that predation takes a heavy toll of large eels. Thus early maturity was evident on the South Sloblands, 9 - 10 years being the modal age group. Maturity was later in Lough Key, modal age group 11 - 12 and later still on the River Blackwater where no fewer than 43% were over 15 years. These cases, together with Lough Erne where growth was abnormally fast, gave four contrasting patterns of growth or maturity.

Table 4 shows that no fish appeared in the stomachs of the early-maturing South Sloblands eels and very few in those from Lough Key. In contrast the Blackwater eels which were very slow to mature became largely piscivorous at the small size of 40 cm. The rapidly-growing Erne eels were mainly invertebrate-feeders. The absence of old eels from the Erne suggested that they, too, were an early maturing population and this might suggest that the chironomid diet encourages early maturity while dependence on fish postpones

this development.

It is difficult to draw any firm conclusions about the other lakes because of the lack of certain information on the incidence of the fisheries for immature eels and because of the unknown degree of upstream migration from Lough Derg and Southern Lough Corrib. In the case of Lough Gill it is possible to infer that the diet would encourage late-maturing and that therefore the shortage of large and old eels results from over-fishing rather than from departure at maturity.

Obviously much more extensive work will be required to establish these conclusions. It is felt that the work to date can be used to assess eel populations as they stand. The practical application can be seen in a case like Lough Gill where it is possible to forecast that a reduction of the long-line fishing could be expected to result in an increased population of large eels. Another important application would occur in connection with elver stocking programmes. In cases where small populations of eels were already present, study of the stomach contents would indicate which waters could most profitably be improved by stocking. Present indications are that waters where large eels subsist mainly on invertebrates are to be preferred to those where fish-eating is the rule.

REFERENCES

Deelder, C. L. (1970) Synopsis of biological data on the eel Anguilla anguilla (Linnaeus) 1758. FAO Fish Synops. 80.

Moriarty, C. (1972). Studies of the eel Anguilla anguilla in Ireland, 1. In the lakes of the Corrib System. Irish Fish. Invest. Ser. A. 10.

_____ (1973) Studies of the eel Anguilla anguilla in Ireland, 2. In Lough Conn, Lough Gill and North Cavan Lakes. Irish Fish Invest. Ser. A. 13.

Table 1. Age distributions (percentage of \bar{n})

	5 - 6	7 - 8	9 - 10	11 - 12	13 - 14	15 - 16	17 - 18	19 - 33	\bar{n}
S. L. Corrib	2	13	32	25	16	8	3	1	331
Mid L. Corrib		10	23	22	19	10	7	9	137
N. L. Corrib	1	8	21	25	20	10	9	6	149
L. Mask		5	31	29	18	7	7	3	116
Erne Lakes	6	36	37	18	3				233
L. Gill		6	38	35	13	6	2		95
L. Derg	1	8	22	32	22	10	4	1	259
L. Key		3	12	30	26	17	9	3	256
L. Inchiquin		13	29	27	22	5	2	2	221
R. Blackwater		1	22	17	27	20	9	14	80
S. Sloblands	10	30	22	20	9	5	2	2	91

Table 2. Length distributions to nearest whole number downwards in cm (percentage of \bar{n})

	27 - 39	40 - 49	50 - 59	60 - 69	70 - 90	\bar{n}	\bar{x}	SE
S. L. Corrib	45	38	11	4	2	349	41.3	0.87
Mid L. Corrib	38	45	12	3	2	534	47.3	1.0
N. L. Corrib	43	40	11	3	3	615	43.1	0.42
L. Mask	21	56	15	5	3	127	46.5	0.79
Erne Lakes	18	38	24	17	3	272	49.5	0.64
L. Gill	61	28	6	4	1	124	40.6	0.69
L. Derg	12	54	29	4	1	271	47.4	0.76
L. Key	7	39	31	18	5	365	52.5	0.70
L. Inchiquin	55	31	6	1	7	139	43.3	1.07
R. Blackwater	44	15	14	17	10	141	47.7	1.2
S. Sloblands	32	54	10	3	1	408	44.1	0.42

Table 3. Calculated mean lengths

	Length at age	
	10 years	15 years
South L. Corrib	44	59
Mid L. Corrib	41	54
North L. Corrib	40	58
L. Mask	42	53
Erne Lakes	51	72
L. Gill	41	52
L. Derg	43	58
L. Key	46	60
L. Inchiquin	47	62
R. Blackwater	44	63
South Sloblands	47	59

Table 4. Food in stomachs

	Percentage of eels containing fish (cm length groups)					Principal invertebrates (on frequency basis)	
	30 - 39	40 - 49	50 - 59	60+	N	1st preference	2nd
South L. Corrib	6	17	65	75	161	Chironomidae	<u>Gammarus</u>
Mid L. Corrib	4	27	54	89	160	Leptoceridae	Chironomidae
North L. Corrib	8	20	35	52	255	<u>Lymnaea</u>	Chironomidae
L. Mask	0	6	71		64	<u>Bithynia</u>	Ephemeroptera
Erne Lakes		all sizes	14		161	Chironomidae	Trichoptera
L. Gill	7	19	71		66	Trichoptera	Ephemeroptera
L. Derg		all sizes	4		104	<u>Asellus</u>	<u>Bithynia</u>
L. Key		all sizes	7		140	<u>Asellus</u>	<u>Bithynia</u>
L. Inchiquin	3		36		58	Chironomidae	<u>Valvata</u>
R. Blackwater	17	-----	74	-----	73	<u>Ephemerella</u>	Chironomidae
South Sloblands		all sizes	0		33	Chironomidae	<u>Mysis</u>