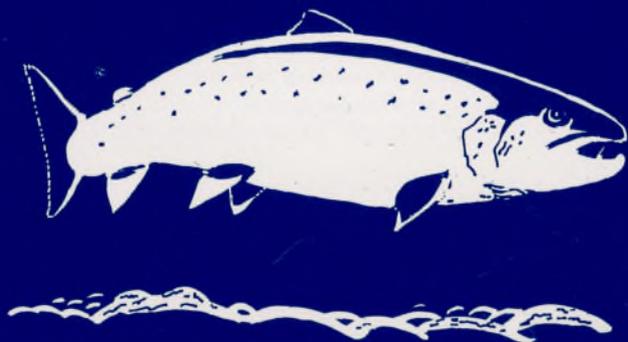




ATLANTIC SALMON TRUST

THE ATLANTIC SALMON IN SPAIN

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THE ATLANTIC SALMON IN SPAIN

Salmon? Not very likely! That is the reaction one usually gets when mention is made of salmon fishing in Spain. Most people have an image of sun and sand, blue seas, hotels and holiday makers. But there is another Spain. One where high mountains look down on the coast, where the winters are cold and wet, and salmon are to be found in clear rivers running down to the sea.

The northern provinces of the Iberian peninsula run from east to west from the western border of France to the northern border of Portugal, and face northward across the Bay of Biscay. These provinces are quite different from the rest of Spain and are separated from it by the high Cantabrian Cordillera. The land rises steeply from the sea in a series of hills to mountains which remain snowcapped into early summer and where ample rain falls. Much of the land is over 500 m high, the spectacularly rugged Picos de Europa rising to over 2,500 m. The hills are covered with thick forests of pine, evergreen oak, chestnut, hazel, plane and beech, while on the lower slopes large areas have been planted with the Australian eucalyptus. Grouse, capercaillie, wild boar, deer, wild goats and even the predatory brown bear and wolf are still to be found, and are now given a measure of protection within designated game reserves.

The meadows and mountain pastures of these provinces are green all the year round and are grazed by fine cattle. Scattered orange-tiled cabins enliven the landscape and at first sight are reminiscent of the Alps. Some of the settlements along the northern coast are amongst the oldest in Europe, the cave paintings at Altamira and other sites testifying to the importance of wild beasts and hunting to the earliest settlers. In the hills there is always water to be seen, cascading from high cliffs, and bubbling forth from mountain springs. The streams and rivers are quick and clear, with a tinge of bluish green, and run through small villages, past roads and under bridges built in Roman times.

Running from east to west, the northern provinces are those of Navarra, Guipuzcoa, Vizcaya, Cantabria, Asturias, and Galicia. The larger towns, Bilbao, Santander, Gijón and La Coruña are busy coastal seaports, while inland within a series of intersecting glaciated valleys lie many small market towns with industries based on agriculture. The rivers flow northwards from the Cordillera to the sea where they often form long estuaries or *rias* with small but fertile flood plains. Most of these rivers have many contributing tributaries which are steep, and quick to rise and fall. In winter and spring they are fed by snow melt while in summer many of them are fed by underground springs. The waters are generally rich in minerals, and aquatic life is abundant. The larger tributaries offer good spawning grounds for salmonid fish. They are cool, during winter, carry little sediment, and are fast flowing. Trout, eels and large minnows abound.

In past years these northern rivers were famous for their salmon. Thousands of fish were taken from them and may have been exported as far as the markets of Rome. Since the 19th century, however, circumstances have



Figure 1 The northern provinces of Spain, showing the rivers mentioned in the text. Most of these rivers are short and arise from the Cordillera Cantabrica running parallel to the North Coast. Rivers to the south of these mountains are longer, the River Ebro running right across Spain to enter the Mediterranean.



changed. A combination of industrial development close to the coast, the construction of hydro-electric stations, sediment from mining operations, the prevalence of organic and other pollutants, and heavy fishing have sent these rivers into decline. Many of them are now in a poor state, and are comparable with similarly degraded rivers in countries further to the north. However, in some of the rivers salmon can still be caught, and it is of these rivers that we shall write. In them we meet the salmon near the southern limit of its range, under conditions very different from those in the far north.

The Salmon rivers and their catches

Netboy, in his popular book on the Atlantic Salmon, opined that at least 50 Spanish rivers between the French and Portuguese borders once held salmon, ranging from rather short rivers like the Asón and Masma to the much longer rivers Miño and Duero (Douro in Portugal, through which the river enters the sea). The fish are now found in only 20 or so rivers, of which only a handful are of any consequence. The locations of these rivers are illustrated in Figure 1.

Although salmon enter Spanish rivers throughout the year, the great majority do so in the Spring, between April and June. The fishing season starts in March and is over by June or July. Though there were once fisheries on a commercial scale by means of fishing weirs, cruives, and nets these were removed by a Law for Regulating the Development and Conservation of Freshwater Fisheries, promulgated by General Franco in February 1942, after the Civil War, banning nets from all salmon rivers and their estuaries. At first, the 1942 Law was administered by the Forestry Service, but subsequently a National Service of Freshwater Fisheries was set up. The administration has since changed its name several times but most of the fishing regulations were established in the name of the National Service of Mountains, Game and Wildlife (El Servicio de Montes, Caza y Conservación de la Naturaleza) within the Ministry of Agriculture. In 1984 responsibility for management of sport fisheries was handed over to the various provincial governments. Regulation of the fishing, setting of close times, allocation of fishing beats, and prevention of poaching is now carried out locally through the various provincial departments of mountains, game and wildlife. Under their regulations, each salmon caught must be registered and receive a tag, and only tagged fish may subsequently be commercially sold.

The catch statistics are collected locally by the provincial government, and are also lodged with the Ministry of Agriculture and State Bureau of Tourism. Through the courtesy of the latter organisations, and with help from representatives of the provincial governments, we present the catch statistics for the years 1949 - 1985 in Table 1.

From this table it is apparent that the most important remaining salmon rivers, with catches of several hundred fish per annum are, from west to east, the Ulla in Galicia, the Eo on the borders of Galicia and Asturias, the Canero (also called the Esva), Narcea, Sella and Cares in Asturias, and the Deva, Pas and Asón in Cantabria (of these, the Deva and Cares share a common estuary). Even these rivers have shown variable and often declining catches

Spanish Salmon Statistics 1949-1985

Numbers of Salmon Caught by Rod and Line by River and District

	GALICIA									ASTURIAS					CANTABRIA				NAVARRA
	EO Landro	Lerez	Mondeo	Masma	Miño	Sor	Tambre	Ulla			Canero	Cares	Narcea	Navia	Sella	Aaón	Deva	Nansa	Pas
1949	187	1	2	0	1	0	1	10	51	0	600	666	200	715	200	101	48	10	29
1950	220	1	2	2	0	0	1	15	60	0	711	750	288	822	320	112	60	15	30
1951	221	2	2	1	5	0	2	19	78	0	815	782	300	900	558	210	78	22	35
1952	242	3	3	1	7	0	1	23	100	0	900	800	321	915	621	298	90	29	38
1953	258	4	3	1	9	0	1	30	128	0	965	810	360	1052	798	320	95	32	40
1954	544	5	22	20	39	0	31	31	443	0	1478	788	576	2871	1321	298	146	69	224
1955	465	3	15	58	34	0	27	164	339	0	1376	622	725	1068	702	61	88	39	45
1956	433	3	10	30	39	0	21	138	367	0	1701	1108	1169	1236	1008	291	60	110	111
1957	191	3	14	10	23	0	28	177	281	0	855	630	811	978	801	147	51	127	75
1958	191	1	16	16	24	0	15	109	152	0	842	353	755	992	732	140	28	82	65
1959	312	0	21	8	37	0	58	109	96	20	1335	1298	701	2781	1541	361	129	136	94
1960	390	0	26	5	16	0	13	90	99	0	1066	785	374	1381	917	154	51	109	180
1961	56	3	6	2	30	5	21	17	115	7	677	389	280	984	552	55	44	79	96
1962	185	0	16	1	39	1	38	64	140	37	623	592	175	1151	559	158	68	135	87
1963	361	4	19	3	51	4	29	90	269	28	677	555	276	1705	476	189	30	111	61
1964	285	6	84	3	82	4	38	89	261	29	1683	564	359	1027	741	292	25	79	226
1965	375	1	116	2	77	14	11	45	295	115	1365	860	787	1534	1106	289	49	166	158
1966	348	14	23	8	69	30	46	58	97	76	1063	1197	764	1162	1343	255	36	305	324
1967	703	17	30	2	105	39	19	24	357	104	1119	1928	387	1194	773	281	18	226	146
1968	366	10	65	15	82	45	18	11	160	70	1114	860	189	2078	747	285	47	294	110
1969	409	15	79	15	82	48	42	155	435	195	1871	1349	286	2041	881	742	55	466	135
1970	505	8	158	3	96	108	46	31	510	209	1071	1195	137	1853	781	334	36	619	74
1971	233	1	54	3	11	61	7	7	74	93	461	279	18	567	422	133	16	211	47
1972	174	2	84	7	66	113	11	39	291	185	1366	626	10	2230	603	278	75	699	155
1973	166	7	33	5	18	52	1	7	197	100	781	424	2	1176	461	166	37	420	108
1974	144	7	94	3	34	181	6	0	112	104	670	183	0	443	250	136	45	301	31
1975	619	6	78	0	122	301	0	4	189	206	463	818	0	630	192	275	74	522	102
1976	622	5	81	2	127	296	6	0	263	260	321	916	2	306	38	121	16	132	91
1977	316	14	23	0	44	74	3	2	88	194	646	455	6	486	113	152	42	473	81
1978	753	12	52	2	44	329	3	0	296	553	1000	687	22	676	58	308	53	604	41
1979	514	10	3	6	54	30	0	2	24	593	831	793	6	1211	52	405	52	404	37
1980	1222	32	39	12	70	142	0	3	543	741	922	1975	18	1196	182	467	41	568	30
1981	835	7	16	15	27	113	0	14	256	541	682	756	10	678	54	94	65	214	17
1982	187	2	3	0	19	43	0	0	104	291	233	198	9	382	3	69	30	185	0
1983	489	10	0	0	12	36	0	0	104	336	632	851	19	823	70	143	41	428	35
1984	343	15	11	10	35	106	6	1	180	161	348	956	38	551	94	103	25	186	16
1985	389	12	3	11	41	63	2	2	175	166	312	201	10	384	262	57	27	150	8

in recent years. Moreover, several rivers which were in a healthy state at the turn of the century are now in a sad state. Amongst these one may include the Verdugo, Umia, Tambre, Mandeo, Eume, Sor, Landro, Oro, Navia, Nansa, Besaya, Saja and Miera. Two of the largest rivers once entered by salmon in large numbers, the Miño, on the Portuguese border, and the Bidasoa on the French border, no longer support significant salmon fisheries.

The Regulation of Fishing

Fishing takes place on Spanish rivers in accordance with regulations administered by the particular province, based on principles enshrined in the original 1942 Law for the Regulation of Freshwater Fisheries. We have taken the regulations published in 1986 for one province - Cantabria - and have summarised their main provisions below. The regulations for other provinces are broadly similar, though dates, times and permitted baits may differ.

The fishing season for salmon in Cantabria extends from March 2nd to June 29th, except for the River Deva (which has its season extended to July 13th to conform with the regulations of the province of Asturias, which shares the management of the river). The fishing season for trout is from March 23rd to July 27th, but within certain salmon beats trout fishing is only permitted after May 1st (in order to prevent the inadvertent capture of downstream migrating salmon smolts and returning adult salmon), and is forbidden completely in others.

Fishing can take place from one hour before sunrise to one hour after sunset, with a quota placed on the number of salmon which can be caught. At the more exclusive beats, or cotos, a catch of 3 salmon per day per coto is allowed. In other sectors, the free or unrestricted zones, one salmon per day per fisherman is permitted. A maximum of 15 trout per fisherman per day can be caught. There is a size limit for trout of 19 cm.

Fishing with natural baits is allowed, but angling with fish eggs, mealworms and cornworms is forbidden. Spoons and Devon minnows can be fished with spinning rods except on one beat of the river Pas where foul-hooking is a particular problem. Live bait fishing is not permitted at some named beats, but is allowed elsewhere, including the unrestricted zones. Fishing by a method called 'Bingo' is expressly forbidden. (This particular method involves fishing with a live minnow, weighted with a small piece of lead to which three or four very small hooks are attached).

Allocation of the right to fish is quite complicated. First of all a licence to fish is required. This allows the holder to fish in any unrestricted beat for an indefinite period, provided not more than one salmon per day is caught. Should there be more than one angler seeking to fish the same unrestricted beat, a time limit of half an hour's fishing is imposed, each angler taking his turn. Access to the prime beats is controlled. Each day of fishing at a coto is allocated to fishermen by ballot conducted by the provincial Department of Agriculture. The beat can be fished by up to 3 fishermen, participating as a group. Invited guests may fish for trout in the beat if they are accompanied by one of the fishermen who has been allocated a place, but they must also hold a permit from the bailiff.

The result of these rules is that fishing, particularly at the more exclusive beats, is highly regimented, with each fisherman requiring both a licence and a permit to fish that particular beat on that specific day. Adherence to the regulations is enforced by a team of bailiffs, assigned to each river. These guardas generally live close to the river, often in houses owned by the provincial government, and wear smart green uniforms. They are often equipped with cars and motor-cycles and work closely with the local Guardia Civil, the National para-military police force, in controlling poachers.

The bailiffs are also responsible for recording the capture of each fish, and for providing the captor with a tag certifying the catch and enabling it to be sold. The ceremony of tagging can be carried out on the river bank (Figure 2), but fish are often taken to a local bar serving that particular stretch of the river, where they may be measured, weighed and their capture celebrated with a glass of vino especial, or something stronger.

In Cantabria the tag consists of circular cardboard disc (Figure 3), carrying a number, a date, and the name of the river where the fish was caught. It is affixed to the tail of the fish by the bailiff with a wire and lead seal. The bailiff separately notes the details on a numbered form or guia (Figure 3), which includes a number for the fish, the name of the river, the location of the beat, the name of the pool or pozo, the date and time of capture, the bait or lure employed, the weight of the fish, its length and girth, and the name of the fisherman and his province. The certificate is stamped and signed by the bailiff and handed to the angler. A copy is retained by the bailiff and a duplicate is lodged with the provincial Department of Agriculture.

This system of tags and certificates facilitates the collection of fishery statistics and restricts the trade in illegally captured fish. It results in a premium price being paid by restaurants and bars for the tagged fish, which can be placed on display for the admiration of customers. Imported fish and particularly farmed fish are much less esteemed and sell at much lower prices. The system does, however, require a team of bailiffs, financed by the provincial government, able to tag and certify the fish on the spot, and is best suited to rivers where fishing activity is heavily regulated and supervised.

Fishing as a Sport

Spain is unique within Europe in having dedicated the fishery resources of its rivers entirely to anglers for almost half a century. Coastal netting, and netting within rivers are banned.

At the best angling beats, everything possible is done to enable the angler to enjoy his sport. The location of the beat is signposted (Figure 4). Pleasant chalets, or refugios are provided for the angler (Figure 5), some of them equipped with benches and fireplaces and with steps, walkways and piers provided to enable anglers to reach their fishing stances, or posturas, with a minimum of inconvenience. The rivers themselves can be very picturesque, and are often set within magnificent mountain scenery.



Figure 2 A salmon, caught on the River A^on, is inspected by a guarda before receiving its tag.



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GUIA DE PROCEDENCIA (SALMON)

SALMON macho / hembra pescado en el río Asón

Lugar de Libre pozo denominado Puente viejo

el día treinta a las diecisiete horas

cebo empleado Cuchasilla

CARACTERISTICAS DEL SALMON

Peso en gramos 8,000 grm.

Longitud en cm. (1) 0,92

Circunferencia máxima del cuerpo en cm. 0,50

RESEÑA DEL PESCADOR

Pescador D. Francisco Ortiz Esteve

Residente en la provincia de Canstader

En Udalla a 30 de Marzo de 1986

EL EXPEDIDOR,
Jose Garate



(1) Medida desde el extremo anterior de la cabeza hasta la escotadura de la cola.

Figure 3

An example of a certificate of origin, or guia, for a salmon caught in the River Asón. A circular cardboard tag (above, with both faces displayed) is attached to the fish with a lead seal. The accompanying form of provenance gives details of the fish.



Figure 4 The signpost to several cotos, on the river Asón. These exclusive beats are awarded by lottery for one day only.

However, because they are spate rivers and are quick to rise and fall there is a tendency for debris to accumulate along the banks and in the branches of trees. Close to villages this can be particularly unattractive, with plastic bottles, coloured polythene bags, and discarded items of clothing festooned from the bankside vegetation.

The best time for salmon fishing is from March to May, after which the river levels can decline dramatically, making angling less attractive. Spinning with a spoon or *cucharilla*, is commonplace, but this method is scorned by the more experienced anglers who prefer to fish with live bait or by dry and wet fly, though conditions do not always suit the latter. Live bait fishing with worms, prawns or even large stoneflies (Plecoptera) using a long collapsible rod is practised with great skill (Figure 6), and the majority of fish are caught by this method (Table 2).

Fishing within 50 metres upstream or downstream of a weir, dam, or fish pass is forbidden, but many of the better beats are situated close to obstructions and rely on fish accumulating in deep holding pools. In midsummer, when many stretches of river dry up and become impassable, these pools become important concentration points for salmon, which under these conditions are very vulnerable to poaching.

Many of the anglers who take out licences subsidise their sport by selling the catch, and in the past some of them could be properly regarded as professional fishermen. Attempts were made in recent years to limit the sale of salmon to those caught in the unrestricted zones, thus forbidding the sale of fish taken from the *cotos*. The scheme proved unsuccessful, however, and was ultimately abandoned. Now, interest in fishing for sport is growing, and anglers from all over Spain travel to the North. About a third of the anglers on Cantabrian rivers are from outside the province, and on some rivers, like the Deva with its spectacular mountain scenery, the proportion of outside anglers is much higher. Some anglers group together to form a salmon bank, from which members can draw fish on the understanding that they will later pay another fish back. There is also a variety of very active fishermen's organisations, financing stocking, organising fishing contests and promoting angling as a sport.

Poaching

Poaching is common in some areas though the degree of damage resulting from it is difficult to estimate. During the Civil War (1936-39) many rivers suffered badly from illegal fishing. Much of the poaching nowadays consists simply of individuals fishing in the wrong season, or in the wrong place, but in addition there is some organised poaching - which is assisted by the narrowness of some of the rivers, and the presence of many obstructions, both natural and artificial. Where fish have concentrated, or are held back by weirs, it is all too easy to net them, trap them, spear them with a trident, foul hook them, or shoot them with spear guns. The laws are strict, the rivers well policed, and the sale of salmon is controlled, but some poaching is inevitable. The capture of poachers, or *hombres furtivos*, as they are called, is often a dangerous business, and at times the bailiffs are armed.



Figure 5 A refugio or chalet at Clavo, on the river Asón. Note the steps and walkways. This elegant building does not resemble the typical Scottish bothy, but essentially serves the same purpose!



Figure 6 Fishing for salmon with live bait at the Vertederas beat on the River Ason in April. A 7 metre long collapsible carbon fibre rod is being used, with prawns as bait.

Table 2 Percentage of fish taken by different baits, determined from the guias for fish caught in four Cantabrian rivers, 1983-1986

River	Prawns	Worms	Mixed Prawn and Worm	Spoon	Freshly Killed Minnow	Fly	Devon
R. Pas N = 994	42	10	23	8	8	8	1
R. Ason N = 552	39	13	3	33	7	5	0
R. Nansa N = 138	51	0	17	27	0	5	0
R. Deva N = 393	33	13	46	2	0	3	3

The fish

Few, if any, salmon have ever been tagged in Spanish rivers, and the marine feeding grounds of the fish can only be the subject of speculation. Two fish tagged by Canadian workers at Disko Bay, Greenland were once recaptured, in the Rio Asoń and Rio Sella. Moreover, a number of fish tagged as juveniles in the south west of France have been recaptured in the West Greenland fishery (Swain, 1980). Most adult fish return to the rivers of northern Spain in the Spring, though recently there has been an increase in the number of fish returning in the Autumn, outside the fishing season. There are no legal salmon fisheries in coastal waters, and seals are uncommon along the French and Spanish coasts, so that the returning fish face few hazards until they enter freshwater. Only small numbers of fish are landed at coastal ports as by-catches from the summer coastal fisheries.

The fish themselves are large, averaging about 5 kilogrammes (11 pounds) and often weighing up to 10kg (over 20 lbs). The majority are multi-sea-winter fish, with very few grilse being caught (Figure 7). However, grilse are probably underestimated in the catch as their time of entry lies outside the salmon fishing season. Evidence that some grilse are encountered is provided by some grilse being caught in particularly warm summers, from past records of netting stations and from the collection of broodstock in the Autumn.

Spawning takes place on coarse substrates in suitable tributaries and in the main stems of rivers between mid November and mid January, though it may occur as late as March in some places. After hatching in one to two months, depending on the temperature, the young fish grow quickly (and do not show the strong winter scale bands typically shown by fish from more northern European rivers). A length frequency distribution is shown in Figure 7 for a sample of 54 juvenile fish captured on the Rio Asoń in April. Several fry, parr and also several smolts are included. The smolts themselves are rather longer and heavier than most Scottish smolts, though they are on average younger with freshwater ages of 1 and 2 years predominating. The smolt run begins in late February, and can extend into late April and early May. Predators upon the young fish include gulls, eels and trout.

A range of different local terms are applied to the different stages in the life of the salmon. We have listed the more common terms in Castellano, but there may be other words in Gallego or Euskera (other Spanish languages).

egg	<u>huevo, hueva</u>
alevin	<u>alevín</u>
fry	<u>alevín, jaramugo</u>
parr	<u>pinto¹</u>
smolt	<u>esguín¹</u>
grilse	<u>ańal, agostizo²</u>
spring fish	<u>salmón de primavera, abrileno, mayuco³</u>
winter fish	<u>invernizo⁴</u>
kelt	<u>zancado⁵</u>
precocious parr	<u>vironero, sirón</u>

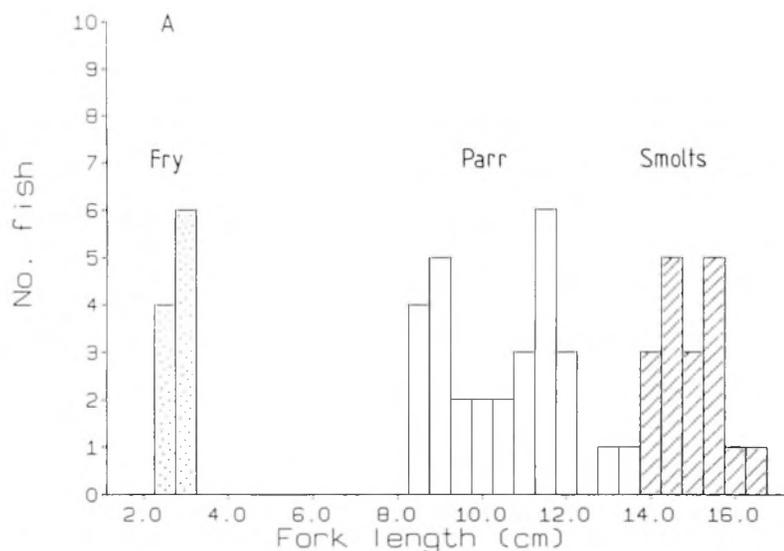
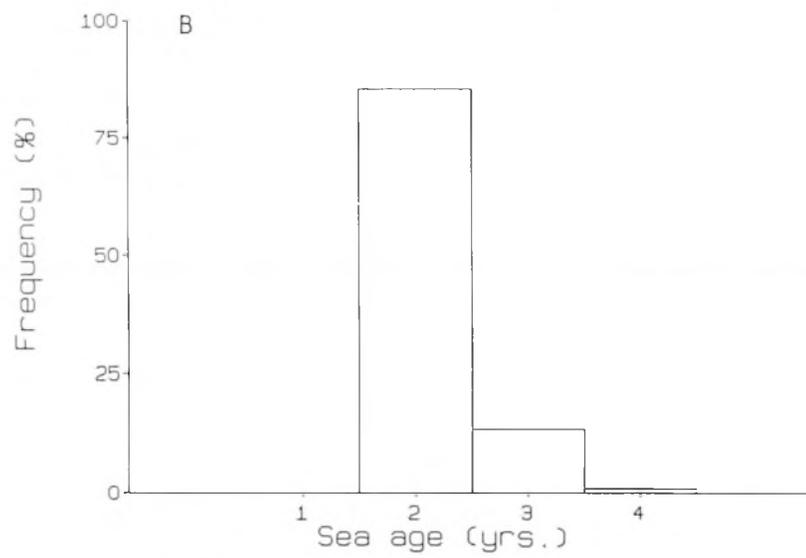


Figure 7a A. Length frequency distribution for a sample of 54 juvenile salmon captured by electrofishing in the River Asón in April 1986.



B. The sea ages of a sample of 93 salmon captured on the River Asón in April - June 1986, obtained by scale reading. Some grilse may enter the rivers outside the fishing season.

The terms pinto for parr and esguín for smolt are often confused or treated as synonymous e.g. Allan & Ritter (1977), Camino (1940).

añal literally means one year old, and is sometimes applied to smolts migrating to sea after 12-18 months of freshwater residence. Agostizo refers specifically to fish (usually grilse) entering the river in August or late summer.

The terms abrileño and mayuco refer to fish of average length entering in April and May respectively.

invernizo literally means 'from the winter' and is applied to large fish entering the river in January - March.

zancado is sometimes applied to returning previous spawners.

The catch statistics

During the Civil War and in the immediate post war period, all the salmon rivers were heavily fished by a great variety of fishing methods (including nets and even explosives). There is no way of reliably estimating the harvest of salmon during this period but it is likely that great reductions in the size of the spawning stocks took place. Following the 1942 Law regulating the salmon fisheries, responsibility for the collection of catch statistics fell to District Forestry Departments. Manpower was scarce, however, and it was not until 1945 that a National Service of Freshwater Fisheries was established and catches began to be recorded more accurately. Later, the Guardería de Pesca Continental - a national organisation of bailiffs - was set up, and from 1960 onwards the collection of statistics began in earnest. The present system of issuing guias ensures that the legal catch is reliably reported.

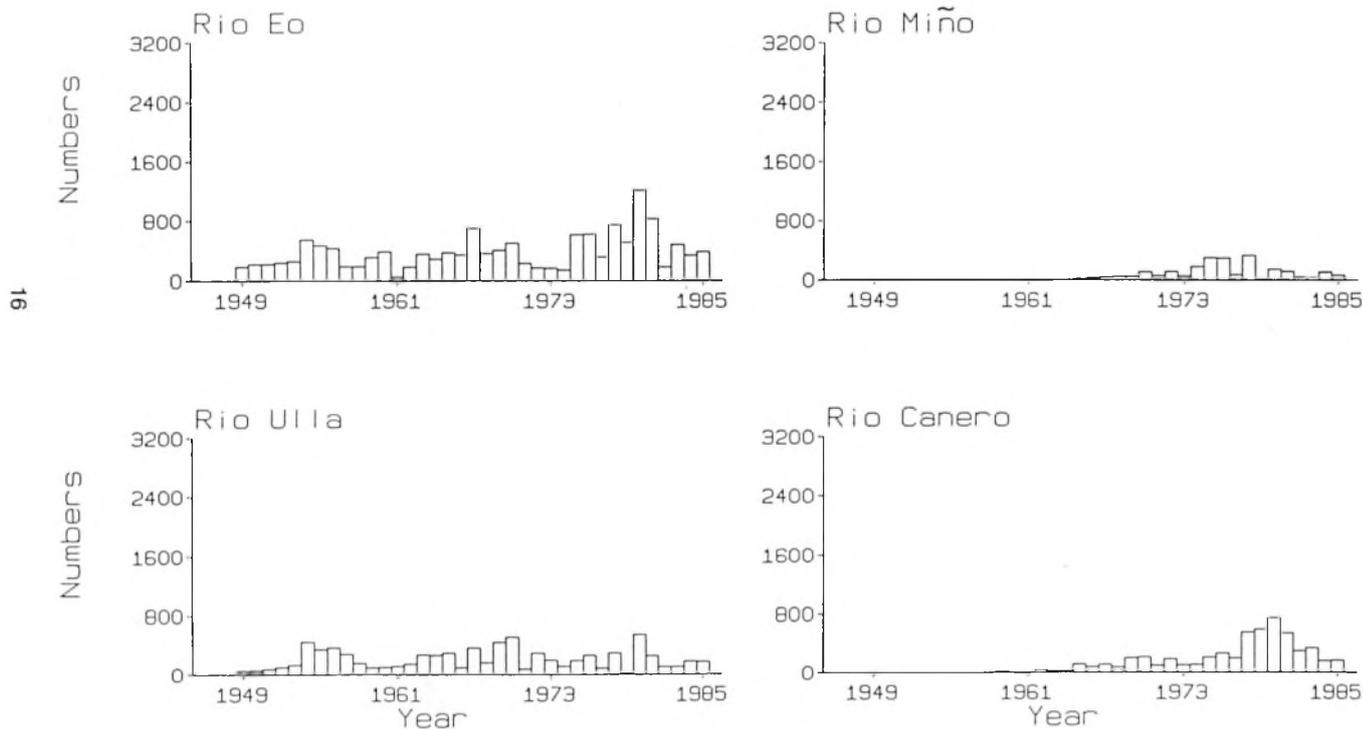
Salmon catches for the principal rivers of Northern Spain are presented in Table 1. These catch statistics cannot be regarded as reliable estimates of the state of the combined adult Spanish salmon stocks, because they are greatly affected by local factors and conditions. Four of the rivers produced their highest recent catches in 1980 (the Eo, Ulla, Canero and Narcea) and three produced their best figures in 1960 (the Cares, Nansa and Asón). There is only slight correlation between some of the rivers within the same geographical district or between rivers irrespective of their location. This poor association is found in catch statistics from other countries.

The catches for several of the more important rivers are shown in Figures 8, 9 and 10.

The River Pas, in Cantabria, was particularly damaged in the Civil War and subsequently. The low catches prior to 1960 may also reflect a poor collection of statistics. The river is especially prone to low flows under drought conditions, and in recent years the construction of a new water abstraction facility for the city of Santander, and a scheme to canalise part of the river to prevent flooding, may have impaired the ability of fish to spawn. There has been some stocking in the Pas since 1975.

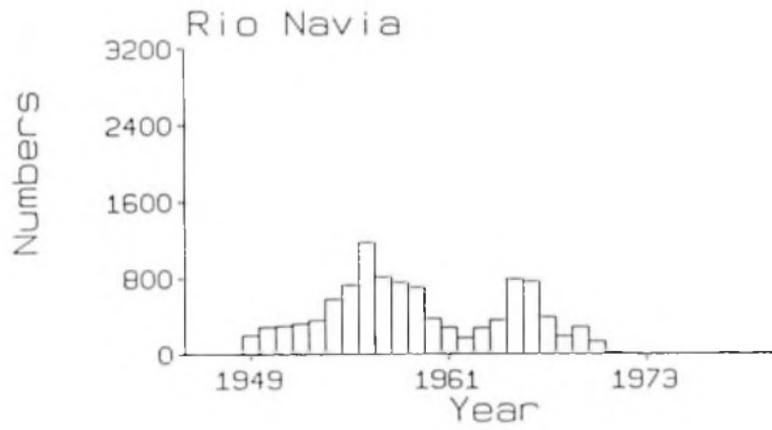
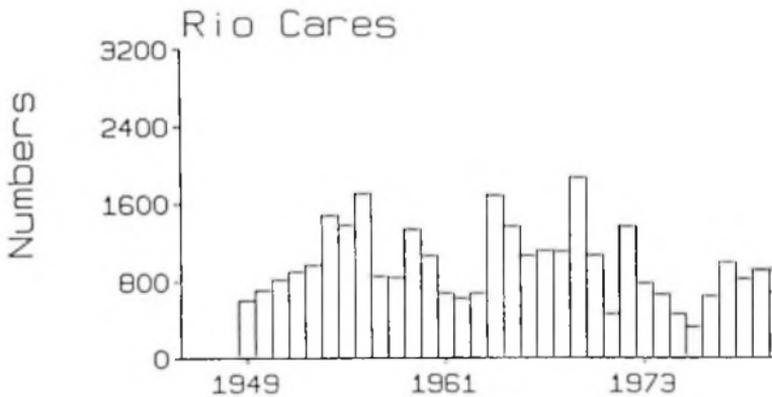
Salmon Rod and Line Catches

Figure 8



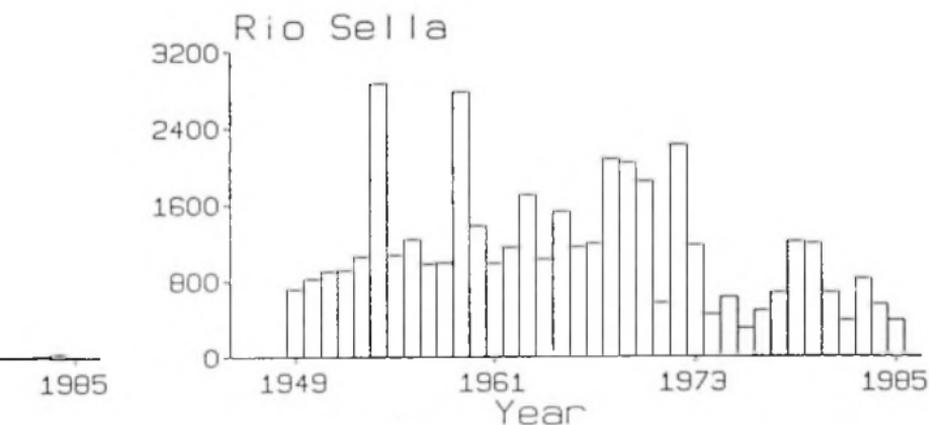
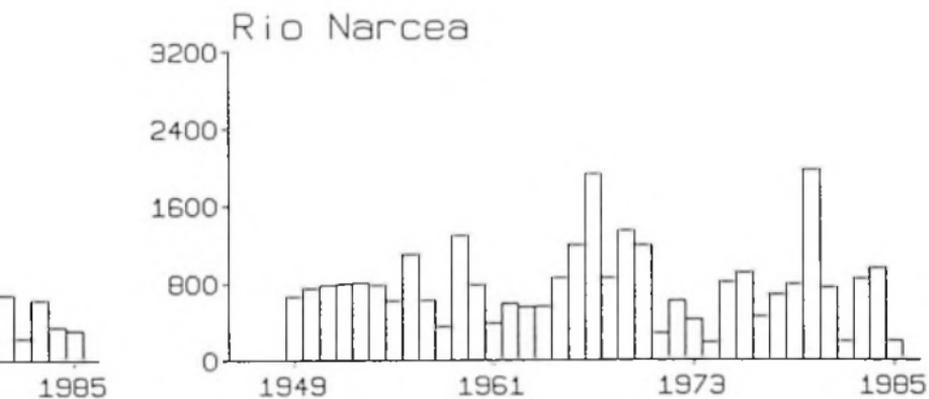
Salmon Rod

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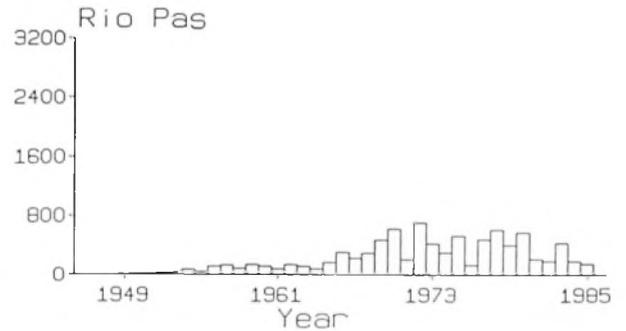
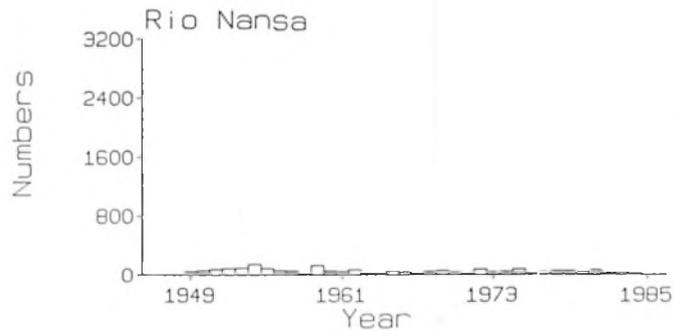
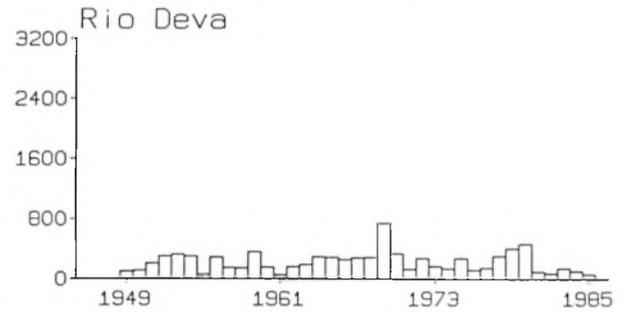
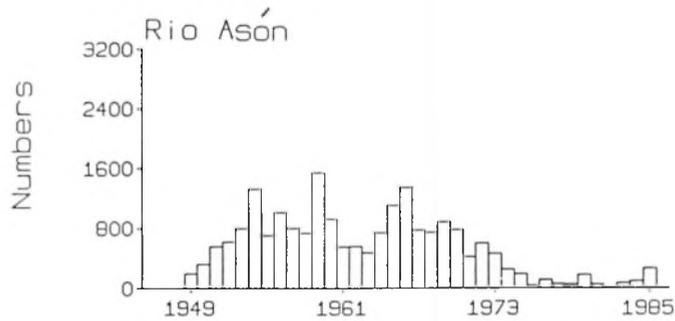
and Line Catches

Figure 9



Salmon Rod and Line Catches

Figure 10



The River Asón, in Cantabria, has shown a major decline in catches since the early 1970's. The reasons for this decline are far from clear, though a high incidence of disease, said to be UDN, is believed by many to be responsible. There has been some stocking in the Asón since 1973.

The Rivers Deva and Cares, on the border of Cantabria and Asturias, perhaps the most attractive of the Spanish salmon rivers, show fluctuations from year to year but remain consistently healthy. They are well policed, and relatively free from obstructions. In dry years, the abstraction of water for irrigating the crops can be a problem. There has been some stocking in the Deva since 1976.

Increases in catches in the River Canero (or Esva), in Asturias, since the early 1960's may be associated with improvements in the collection of the statistics, but one important factor may have been a breaching of a dam just above the estuary. Damage caused by several heavy spates may have allowed increased spawning in the upstream sections of the river. There has been some stocking in this river since 1970, with local stocks and this may have also contributed to its resurgence in recent times.

The River Navia, in Asturias, has shown a sharp decline in catches since the late 1960's following the construction of the Arbón dam, some 8 km from the estuary. The dam lacks a fish ladder, greatly reducing the opportunities for fish to move upstream to spawn.

The River Sella has, at times, suffered heavily from disease, but otherwise is relatively healthy and free from serious problems.

The Rio Miño in Galicia marks the border between Spain and Portugal. The international nature of the river creates problems in regulating policing the fisheries. The early statistics for this river were poor and the more recent figures may still be unreliable. Netting for salmon is permitted in the Miño by the Portuguese administration.

Dams, weirs and other obstructions

The rivers of northern Spain are not only rather variable in their flow rates, they also display a variety of both natural and artificial obstructions to the upstream movement of fish. Gradients can be steep and rocky, with many natural sills, cataracts, and falls. In summer, whole sections of some rivers and their tributaries can dry out or go underground. The problem of low water levels is particularly prevalent in dry summers, where water may be removed from the rivers to irrigate adjacent fields. In addition to these natural obstructions to movement there are many weirs and dams on the rivers, some of them antique and associated with mills and factories long since defunct, while others supply water to textile mills, dye works, farms, hydro-electric stations, and to the cities for domestic consumption. Figure 11 shows the numbers of weirs and dams on the Rio Asón, and illustrates the many obstructions which have to be overcome by ascending fish.

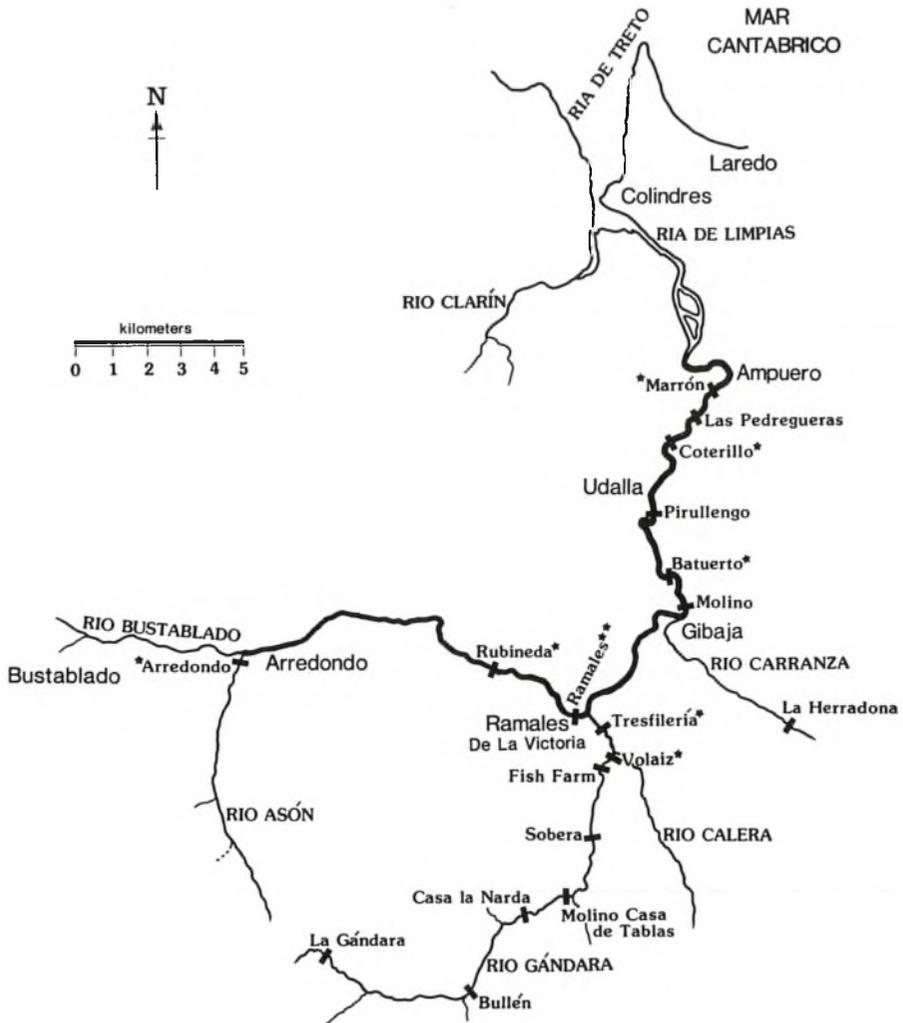


Figure 11

The River Asón illustrating the many obstructions to the upstream passage of fish. Access to the part of the river above Arredondo is poor due to a defective fish pass, and entry to the Gandara and Carranza tributaries is extremely difficult. Weirs are shown as bars. Stars indicate fish passes.

The abstraction of water which is not returned to the river, or which is returned contaminated or at a higher temperature, can pose severe problems for upstream migrants. In addition, the weir or dam associated with the abstraction scheme can block the upstream passage of fish, preventing them reaching spawning grounds, increasing their mortality, and perhaps giving an increased prevalence of disease in those areas where fish concentrate. Such obstructions are not necessarily unpopular with the fishermen. Locally, they may allow greatly increased catches of fish which are unable to distribute themselves further upstream. Many believe they can also serve a useful purpose in providing deep holding positions throughout the summer when other parts of the river may dry out.

By law, all dams are intended to have fish passes, but many of them are old, or were built at a time when concern over the fate of migratory fish was less keenly felt, despite a law of 1795 requiring channels to be kept open. Even where the dams are modern, however, the ability of fish to move upstream is greatly impaired. Fish passes may be too steep, too long, or inappropriately sited to funnel in the upstream migrants (Figure 12). The upstream exit may be sited too close to the spillway, causing fish to be returned downstream. Some are dry, or may be deliberately blocked by anglers or poachers. The smaller weirs, which lack fish passes, may have the wrong profiles for allowing fish to pass upstream by swimming or leaping. Migrating smolts may also be damaged by the lack of suitable smolt screens to prevent fish passing through the turbines or into abstraction intakes.

A very good example of an unsuitable fish pass is at the Palombera dam on the Rio Nansa, once a fine salmon river. Figure 12 shows the fish pass, now dry and choked with weeds. In travelling upstream past the entrance to the fish ladder the migrants come face to face with the 60ft high wall of the dam. On the nearby Rio Pas, a new weir at Soto de Iruz installed to supply water to the city of Santander lacks a fish pass altogether, while further upstream a massive engineering operation is underway to divert the river into a long canal.

It is probably that these various barriers and obstructions contribute greatly to the decline in stocks on many of the rivers, both through impairing the ability of fish to reach upstream areas to spawn, and making it easier to catch upstream migrating fish. As with many salmon rivers elsewhere, however, the removal of even redundant dams seems to be extraordinarily difficult to bring about. It is firmly believed that the pools associated with these dams provide vital water for the fish through the drier parts of the year, and that removal of the dams and weirs will empty the main holding pools, impairing the survival of fish. Opposition to the construction of new dams is often seen as the obstruction of progress, delaying the establishment of much needed industry. As the north of Spain becomes increasingly prosperous there will no doubt be a greater need for hydro-electricity and water for domestic and industrial purposes. It is important that these services be provided without further obstructing the movements of fish.

Pollution, both by sewage, domestic rubbish and by industrial effluents also poses problems. In many of the inland villages the arrangements for disposing of domestic waste are primitive, and can result in substantial

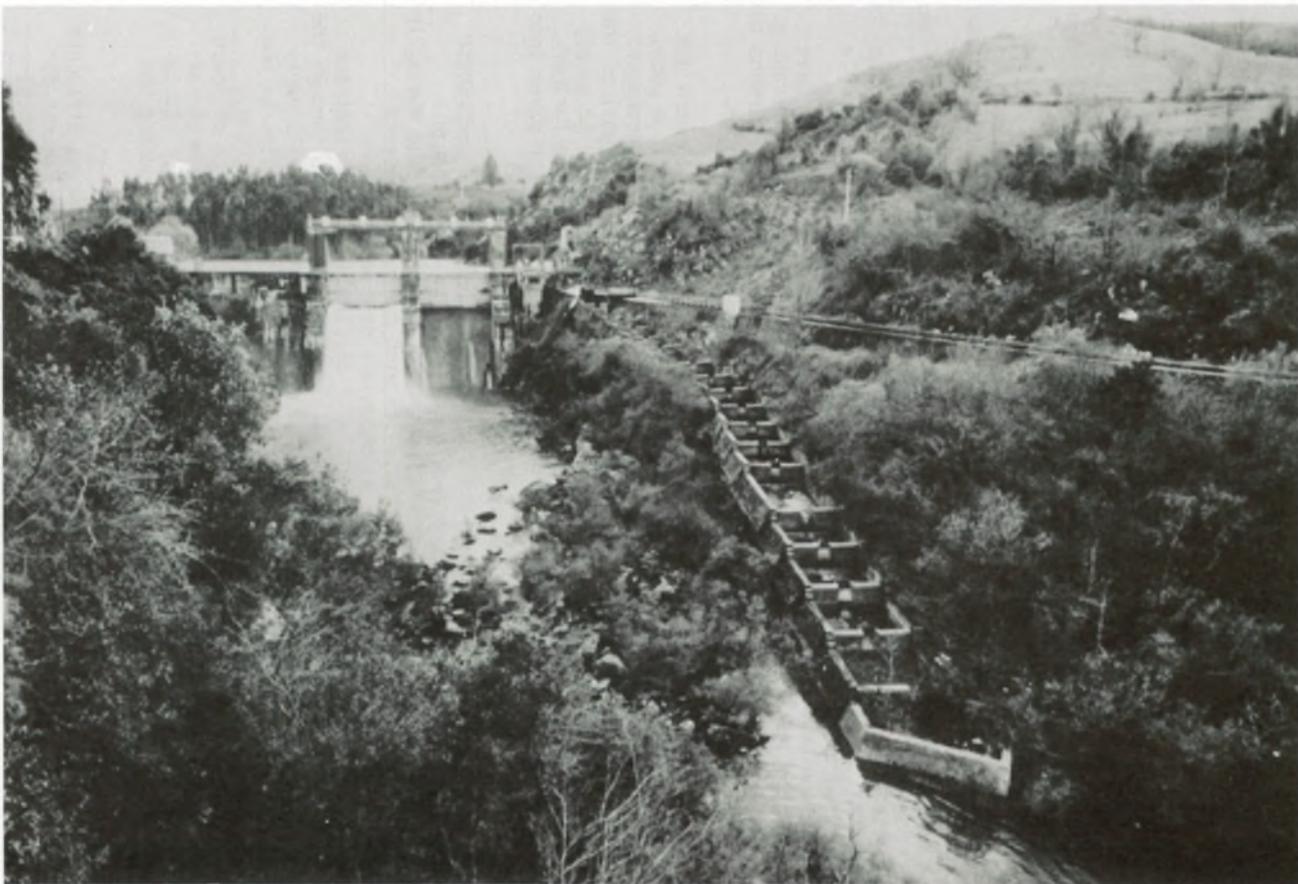
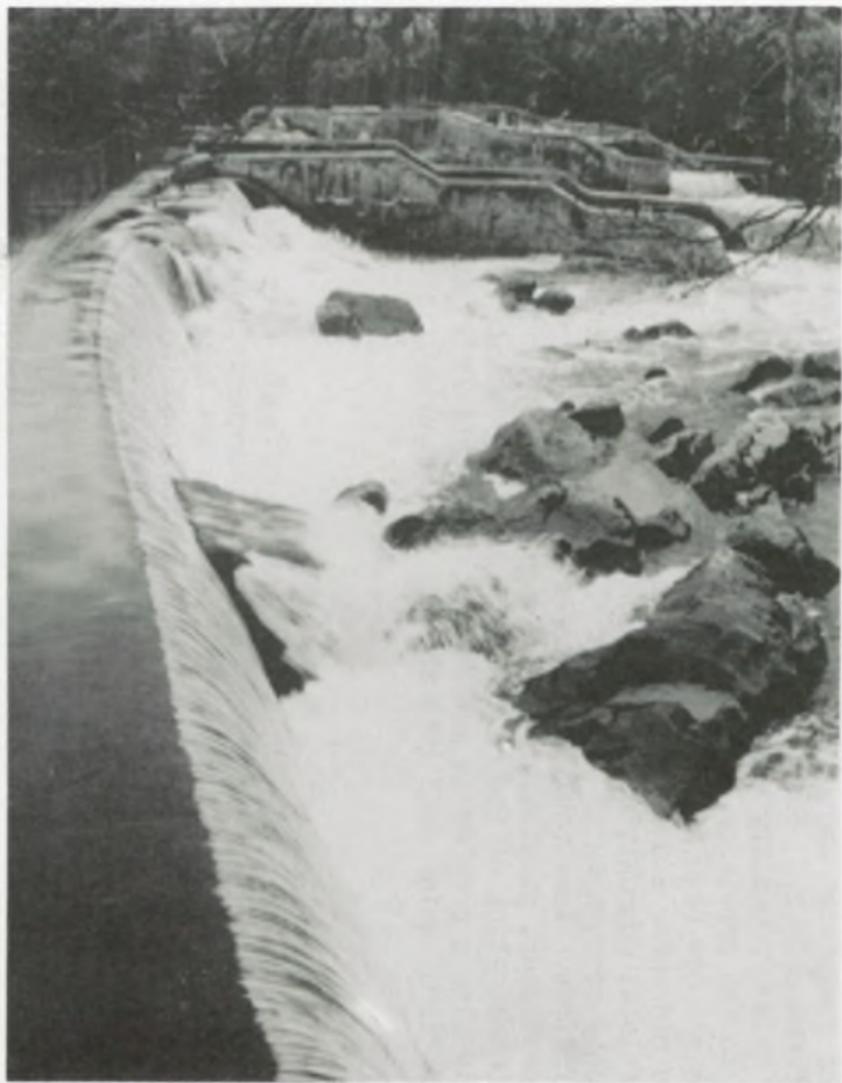


Figure 12 La Palombera Dam on the River Nansa, with its dry fish pass.



Figure 13 A. An old hydro-electric station on the River Ason, now purchased for conversion into a hatchery. Salmon spawn in the lade from the station.



B. A weir with 2 fish passes
at Ramales on the River Asón.

quantities of raw sewage and other materials ending up in the rivers to the detriment of the salmon. Fortunately, the best salmon rivers still yield high scores in water quality assessments and, moreover, consideration is now being given to the provision of treatment works. Modern housing developments are now required to have septic tank systems, but many of the problems are old ones, and arrangements for their alleviation are often in the hands of local communities. Industry is essentially regarded as something to be encouraged in this part of Spain, rather than blocked by undue restrictions. Inevitably the result is that local chemical and thermal pollution does occur, particularly in rivers close to the larger industrial cities. Contamination of the rivers with suspended solids from mining operations is also a problem in some areas, particularly in Asturias but also in the River Miera, which runs into the Bay of Santander, in Cantabria.

Stocking

In recent years fishermen in several areas of Spain have joined together, and with the help of the provincial governments have mounted restocking programmes on a number of rivers. Eyed ova have been imported from several countries, including Scotland and Iceland, and have been planted out in tributaries. So far the number of eggs stocked have been relatively small, but these activities represent a step in the right direction, which may go further in the future. There are several notes of caution to be sounded, however. Firstly, the origin of the eggs to be stocked will need to be looked at carefully, to ensure that they are taken from appropriate stocks and that they are free from disease. Eggs originating with broodstock from hatcheries in Iceland, Norway and Scotland may not be the most suitable, since deliberate or inadvertent selection of fish may have taken place to produce fish suited to the local environments. Such fish may be poorly suited to living in Spanish rivers. Preferably, eggs should be chosen from stocks similar to the native stocks of spring-running multi-sea-winter fish. However, perhaps the best stocking schemes of all would be those relying on native Spanish broodstock. The provision of local hatcheries, with broodstock taken from among the fish held up by dams and obstructions and unable to reach natural spawning grounds, would ensure that the eggs produced are those most appropriate to local conditions.

There is little advantage to be gained by stocking areas where natural spawning is already taking place, or where there is already a plentiful supply of young fish of local origin. There is a need to identify suitable juvenile habitats which are not being reached by spawning adults (through barriers, or the presence of locally concentrated pollution, or suspended solids), and to stock these areas at a sensible level. Common faults are too high a stocking density, the placement of eggs in unsuitable releasing boxes, and stocking in inappropriate locations.

The provincial government of Cantabria has recently purchased an old hydro-electric station at Arredondo, on the River Asón, in an area where natural spawning is known to occur, and are converting it to a hatchery able to provide eggs of local origin for restocking (Figure 13). This very worthwhile project demonstrates the commitment of the government and fishermen's organisations to the improvement of the salmon rivers. Though the future of salmon in Spain is at best uncertain there are anglers and

officials who are passionately concerned to preserve those stocks which remain.

Access to the Spanish salmon rivers

From Britain, there are direct sea links with the north of Spain via the Plymouth-Santander ferry, which operates throughout the year and takes some 24 hours to complete the trip across the Bay of Biscay. Alternative sea links also exist between various ports in England and the continent, and the northern provinces can be reached by way of France and the border near San Sebastian.

Regular service flights and seasonal charter flights depart from the UK to the main cities of Madrid, Bilbao, and Santiago de Compostela. From these cities it is easy to travel to the main salmon provinces of Cantabria, Asturias, and Galicia by domestic flight, train or road.

Accommodation can either be arranged in the cities of Santander in Cantabria, Oviedo or Gijón in Asturias, La Coruña, Santiago or Vigo in Galicia, or can be sought in some of the smaller villages closer to the rivers of interest.

Taking your own vehicle aboard the Plymouth-Santander ferry may give more flexibility while fishing in Spain but driving with a right hand drive car on the 'wrong' side of narrow winding roads may not suit everyone. Alternatively, vehicles may be rented at the principal airports and cities but this tends to be more expensive than in Britain.

The best time for salmon fishing in most Spanish salmon rivers is in April and May, sometimes coinciding with the local Easter holidays. Advanced travel and accommodation booking is thus advisable but not essential.

Some of the local tackle shops are well stocked with a variety of fishing gear including local and imported rods and a collection of suitable lures and baits. Live bait (various worms, fish, prawns) may be arranged through the local tackle shop or obtained from the bailiffs. It is often best to consult the local angling association or the bailiffs for advice. Bailiffs do not normally speak English so some knowledge of Spanish is desirable. Although they normally speak very quickly, often employing local words when referring to salmon fishing, they can slow down if asked to do so. Bailiffs do not need to be tipped but a bottle of wine is always appreciated.

Food in the numerous local bars, taverns and restaurants is usually inexpensive and good. In the coastal towns and cities the *tapas*, or bar snacks, often based on sea foods, are particularly worth sampling. In villages near the main rivers the bars and restaurants are unsophisticated, but the food is good, wholesome and very cheap. Lunch is often served slowly, and may last from one thirty until three or four in the afternoon.

Despite popular belief, the weather in this part of Spain is unpredictable. Periods of heavy rain may alternate with gorgeous sunshine. Wet weather gear is essential. Average air temperatures in Santander for

April and May are 12 and 14 ° C respectively.

Salmon Licenses

Salmon licenses may be purchased from the regional offices of the local Service of Wildlife and Game. Details on the issue of licenses in Cantabria for the rivers Pas, Asón, Deva and Nansa are summarized below. Licenses for the other salmon regions may differ in particular details. Costs given below are for 1986 and apply to non-resident foreign citizens in the province of Cantabria.

In order to fish for salmon in Spanish rivers a combined salmon and trout license is first required. These licenses are valid throughout Spain and in Cantabria they cost 2280 pesetas (pts) (about £11) for one year and 730 pts for a 15 day period. A current valid license entitles the holder to fish for salmon in all free zones (zonas libres), but only one salmon per day may be legally caught on these beats. Some 1400 licenses per year are issued in this way by the Service in Cantabria alone.

Fishing at the cotos requires an additional permit. Application forms for these permits may be obtained from the Service in each province. Such applications are generally completed by a team or group of three anglers but anglers may only apply once in each season. Although individual applications will also be considered, the total cost per coto remains the same. A refundable deposit amounting roughly to the total cost (see below) must be included along with each application, which in Cantabria should reach the office before the end of November. A ballot is conducted in December to allocate a number to each application, thus establishing the order of choice for the cotos. Anglers are informed by January of their number and then choose their cotos by name and date. Between three and five cotos per day may be selected from those available, all four rivers being included. Thus, the person or group obtaining the number one position in the ballot automatically gains the choice of up to 5 different cotos for different days. The lower you are on the list, the poorer the choice.

The cost per coto/day is 12360 pts. (about £59) but a minimum of three coto/days must be chosen. Hence the total cost would be 37080 pts (about £177) which is normally shared by the three anglers making up the team (£59 per person).

As well as gaining the right to fish in a restricted beat, the use of the chalet or refugio is also gained by the team and their guests (with appropriate permits) for the entire day. A maximum of three salmon per coto/day may be caught between the three anglers. In Cantabria, over 70% of all salmon catches are taken from restricted beats.

Fifty per cent discounts may be obtained on all licenses and permits if the angler belongs to the Cantabrian Association of Game and Fishing. Since membership of the Association is 5000 pts per year, most anglers seeking salmon fishing in the restricted beats find this a way of saving money. Income from the Association is largely invested in purchasing salmon ova for restocking.

Recently plans have been made to facilitate salmon fishing through the various tourist information centres with the publication of special leaflets on fishing in each province.

Useful Addresses

Province: Cantabria
Major salmon rivers : Pas, Asón, Deva
Major cities : Santander, Torrelavega

Address: Servicio de Montes, Caza y Conservación de la Naturaleza
Calle Rodriguez, 5,1
39071 Santander

Province : Asturias
Major salmon rivers : Sella, Cares, Narcea, Canero (Esva)
Major cities : Gijón, Oviedo
Address : Servicio de Conservación de la Naturaleza
Calle Uria, 10-1
33003 Oviedo

Province: Galicia
Major salmon rivers : Eo, Ulla, Miño
Major cities : La Coruña, Vigo, Santiago de Compostela
Address : Consejería de Agricultura, Pesca y Alimentación
Carretera de Santiago a Lugo, Km. 2.5
San Lázaro, Santiago de Compostela (La Coruña)

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The representatives of the Sociedad de Fomento de Caza y Pesca de Cantabria.

The Department of Agriculture and Fisheries for Scotland.

Finally the Atlantic Salmon Trust Ltd., and their Director Rear Admiral D.J. Mackenzie, C.B.

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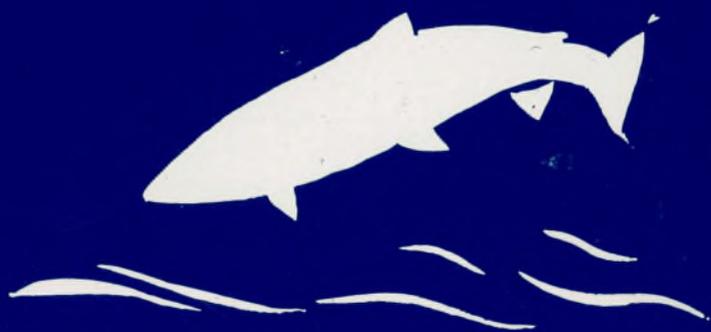
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