ATLANTIC SALMON FACTS

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This publication was originally prepared in 1986 by the Atlantic Salmon Trust to provide answers to the most frequently-asked questions about Atlantic salmon. It was based on information contained in similar booklets published by the Association Internationale de Défense du Saumon Atlantique (France) (AIDSA) and the former International Atlantic Salmon Foundation (North America) (now the Atlantic Salmon Federation), and on Dr. Mills' book, "Scotland's King of Fish".

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Illustrations – The colour photographs are by courtesy of the Freshwater Fisheries Laboratory, Faskally. The recognition guide on Page 12 is taken from a poster by Robin Ade.

ATLANTIC SALMON TRUST

Q. What is the Atlantic Salmon Trust?

A. The Atlantic Salmon Trust was formed in 1967. Its objective is to promote the conservation and restoration of wild Atlantic salmon and sea trout stocks to a level which allows sustainable exploitation, in the countries bordering the North Atlantic Ocean, for the public benefit. Its primary aims are:

a. To conduct, assist in conducting and stimulate laboratory and field research.
b. To develop and refine principles and methods for the management of salmon and sea trout stocks and fisheries.

Q. What does the Trust do?

A. The Trust acts as a focal point for the collection and dissemination of new knowledge about the Atlantic salmon. Its Honorary Scientific Advisory Panel, through which it encourages and supports practical research projects and organises workshops on specific topics in the field of salmon conservation, is internationally recognised. The Trust publishes a series of Blue Books, which covers two main areas:

a. Developments in salmon science and fishery management.
b. Surveys of the salmon scene in particular countries.

These Blue Books are available to all who are concerned about the conservation and enhancement of the Atlantic salmon resource.

Q. What influence does the Trust have?

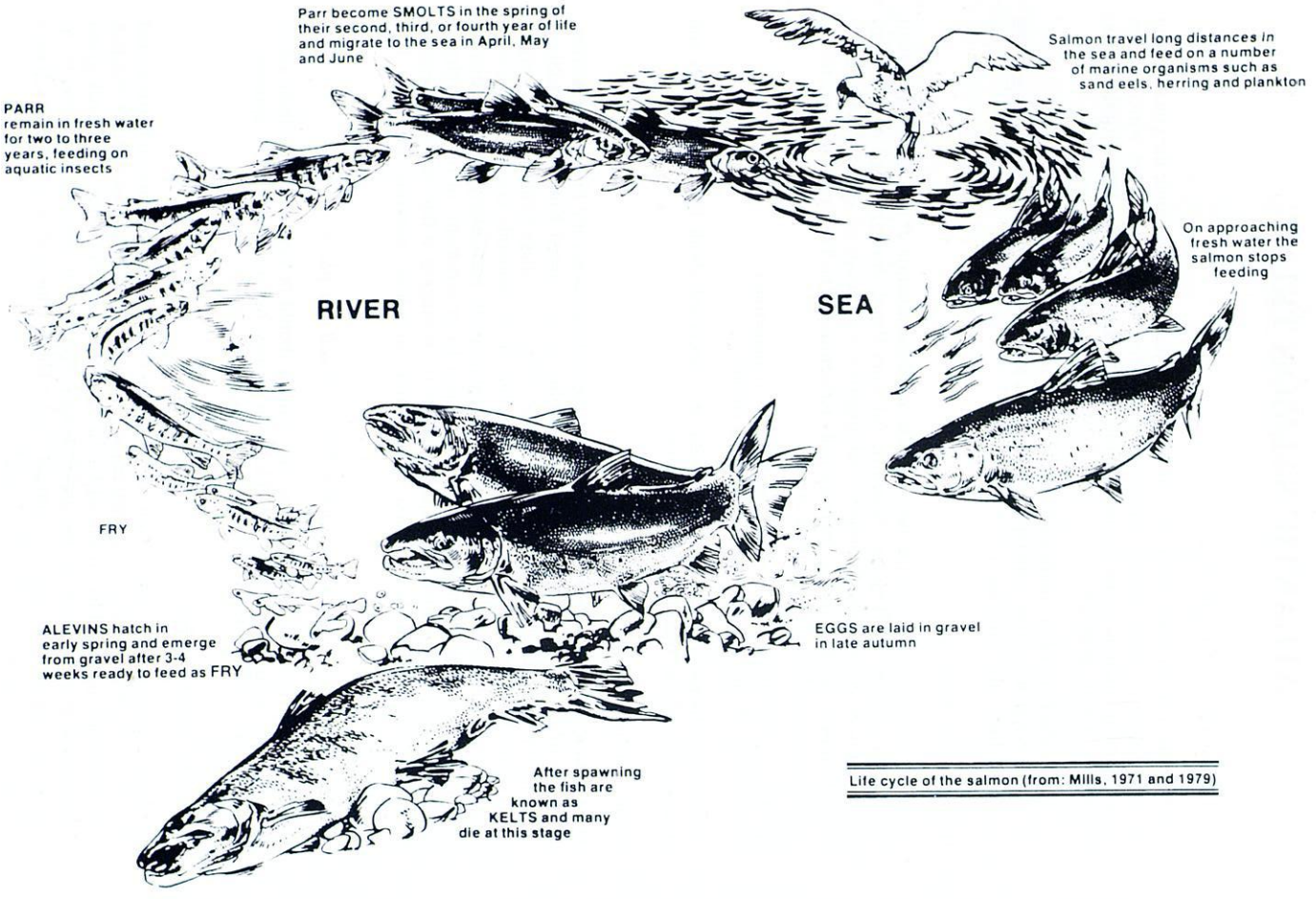
A. The Trust provides a source of advice to Government Departments and Fishery Authorities, and to members of the Parliaments and Assemblies of the United Kingdom, on subjects affecting the wild Atlantic salmon, so that conservation and management decisions may be taken on the basis of the best information available. It is frequently consulted by a wide range of organisations and individuals. With its counterparts, particularly in North America and France, the Trust continues to press for support by governments of the principles of effective salmon conservation. It helped to inspire the formation of the inter-governmental North Atlantic Salmon Conservation Organisation, at whose meetings the Trust is a recognised observer.

Q. What is the Trust's view on where salmon fishing should take place?

A. The Trust believes in the principle that wild salmon should be caught only in their native river systems so that, as far as possible, fishing may be managed in the interests of optimising the numbers of each individual homing population.

Q. How is the Trust financed?

A. The Trust is funded by voluntary contributions from individuals, companies and trusts, and from organisations interested in salmon conservation. Its financial sponsorship of research is considerably supported by an annual Postal Auction, in which fishing generously given by owners is offered for sale on the Trust's behalf. The Trust is registered as a charity. It receives no support from any Government funds. Those who wish to support the Trust's work are encouraged to contact the Director.



Life cycle of the salmon (from: Mills, 1971 and 1979)

ATLANTIC SALMON FACTS

The Atlantic Salmon

Q. What is a salmon?

A. The Atlantic salmon (*Salmo salar*) is an anadromous migratory fish found in the temperate and arctic regions of the Northern Hemisphere.

Q. What does anadromous mean?

A. The Atlantic salmon is referred to as being anadromous because of its habit of migrating from the sea into fresh waters to spawn. This is the exact opposite of the common eel which leaves fresh waters to spawn in the Sargasso Sea, and is therefore called catadromous.

Q. Is there just one species of salmon?

A. When we speak of "salmon" we are referring to either Atlantic salmon or Pacific salmon. There is only one species of Atlantic salmon: *Salmo salar*. There are six species of Pacific salmon: pink (*Oncorhynchus gorbuscha*), chum (*O.keta*), chinook (*O.tschawytscha*), coho (*O.kisutch*), sockeye (*O.nerka*) and Masou (*O.masou*).

Q. Do all Atlantic salmon go to sea?

A. No. Although most Atlantic salmon spend part of their lives at sea there are some which are non-migratory. In several lakes in eastern North America there is a form known as a land-locked salmon, *Salmo salar sebago* (Girard), though their access to sea is not barred. The fish is popularly called Ouananiche (Lake St. John) or Sebago salmon (Nova Scotia, Quebec, New Brunswick, Newfoundland and the New England States). In Lake Vänern in Sweden there is a non-migratory form of Atlantic salmon called "blanklax". Land-locked Atlantic salmon also occur in Lake Ladoga in Russia and in Norway in Lake Byglandsfjord. There are also introduced land-locked Atlantic salmon in South Island, New Zealand.

Q. How big can salmon grow?

A. Atlantic salmon can grow to a very large size and the biggest, which have reached up to around 70lbs (32kg), are usually caught in Norway and Russia. However, some very large fish have been recorded in Scottish rivers. It is generally accepted that the largest one caught on rod and line in the UK was taken by Miss Georgina Ballantyne in the River Tay: it weighed 64lbs (29kg). There is an 1891 report of a monster salmon of 70lbs, also caught in the River Tay, but on this occasion in a net belonging to a Mr. Speedie.

Distribution

Q. Do Atlantic salmon have a world-wide distribution?

A. No. Except for the land-locked varieties, they are naturally limited to the waters of countries bordering on the North Atlantic Ocean and Baltic Sea. The following countries presently have Atlantic salmon, in varying numbers: Canada, Denmark, England and Wales, Faroes, Finland, France, Greenland, Iceland, Ireland, Norway, Poland, Portugal, Russia, Scotland, Spain, Sweden, United States.

Salmon Biology

Q. How do salmon navigate?

A. Salmon navigation is one of the marvels of nature. While the full answer is not yet clear, a number of mechanisms may guide salmon at sea. These include guidance by the stars as well as use of receptors sensitive to local differences in the earth's magnetic field. Ocean currents may also play an important role. Near the coast and in the rivers, salmon are guided by a chemical memory which apparently allows them to recognise and home to substances, including pheromones, present in the water in very minute traces.

Q. Do salmon always return to their own river?

A. Atlantic salmon return to their native river with amazing accuracy. Although some may stray to other rivers, the majority ascend their home river.

Q. Can male and female salmon easily be identified?

A. When they arrive fresh from the sea it is difficult to distinguish the sex of salmon externally. Later the head of the male becomes elongated and grows a protuberance called a "kype" from the tip of the lower jaw. At this stage male and female are easily distinguished.

Q. When do salmon spawn?

A. Spawning time varies between rivers and may be influenced by the water temperature and amount of daylight. Generally spawning will occur during the period November-December in Great Britain and Ireland but may extend from October until late February in our larger rivers.

Q. Do all salmon die after spawning?

A. About 90-95% of all Atlantic salmon die following their first spawning, but some survive to spawn two or three times: as many as four spawnings have been reported. The survivors, predominantly female, return to sea to feed between spawnings.

Q. How many eggs does an Atlantic salmon deposit?

A. Female salmon in most areas produce 450-750 eggs per pound of body weight but the number may rise, for example in Iceland, to 900.

Q. *Where are the eggs deposited?*

A. They are laid in depressions called "redds" excavated by the female fish in the gravel of the river bottom. After the eggs are deposited they are immediately fertilised by an accompanying sea-run male, and often by mature male parr, and then covered with gravel by the female.

Q. *When do the eggs hatch?*

A. The incubation time depends upon the water temperature. Hatching usually occurs in early spring and the young fish (called "alevins") remain in the redd for a few weeks, nourished by the attached yolk sac. When they emerge from the gravel in April or May, they are about one inch in length. As they grow, the young fish develop prominent markings on their sides and are then known as parr.

Q. *How long do young Atlantic salmon stay in the river?*

A. This is dependent upon the water temperature and the availability of food. The length of stay varies very much, from one year in the southern portion of the salmon's range to five or more years in the more northern, colder regions.

Q. *When do they leave the river?*

A. The young fish, now called "smolts", leave the rivers during the late spring. Most will be gone by June.

Q. *Where do they go?*

A. Smolts are believed to move in schools while heading off to deep-sea feeding areas. While the best-known feeding locations are in the Norwegian Sea and the waters off Southwest Greenland, there are known to be many other sub-arctic feeding areas. Salmon that remain at sea for more than one winter undertake the longest migrations, but grilse tend not to travel beyond the Faroe Islands and the southern Norwegian Sea.

Q. *How long do salmon stay at sea?*

A. They remain in the ocean from just over a year to three or four years. Salmon feeding off Greenland generally stay at sea for two or three years

Q. *What are grilse?*

A. A grilse is an Atlantic salmon which has spent only one winter at sea before returning to the river.

Q. *What are the salmon's natural enemies?*

A. At different life stages, the principal predators of salmon are goosanders and red-breasted mergansers, cormorants, gulls, pike, pollack, cod, sharks and seals.

Q. *How high can a salmon jump?*

A. The highest jump a salmon has been known to make in Scotland is a vertical one of 12ft (3.7m) at the Orrin Falls in Ross-shire. The height a salmon can achieve depends upon the relative depth of the water at the foot of the fall and the position of what is referred to in engineering terms as the "standing wave" or hydraulic jump.

Q. *What influences the upstream movement of salmon in a river?*

A. A number of factors affect the movement of salmon up the river. In the spring, water temperature is of great importance, and until the water temperature reaches 42°F (5°C) there is little upstream movement of fish over obstacles. Later in the season movement is affected by river flow and climatic conditions.

Q. *What are the survival rates at various stages in the life cycle of the salmon?*

A. Survival at various stages in the life cycle of the salmon:

Stage	Number of Individuals		% Survival Mean	% Survival Range
River				
Egg	5,000		–	–
Alevin/Fry	4,700		94	–
Fry at end of 1st year[1]	360		8	5-14
Parr (1+ yrs old)[2]	140	= 52 smolts	43	28-53
Parr (2+ yrs old)[2]	77		57	44-67
Parr (3+ yrs old)[2]	39		55	47-65
Mean survival rate from egg to smolt stage is 1.0%				
Sea			% Survival from smolt stage	
Adults returning to coastal waters as grilse and two sea-winter fish	5		10	3-20

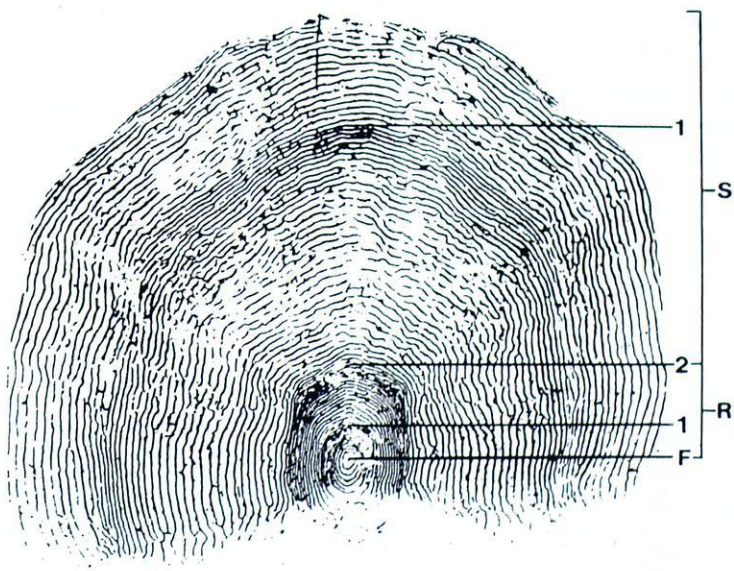
1. 88% of total mortality occurs between March and July.
2. A proportion of these migrate to sea as smolts in the spring.

These figures have been compiled from the work of David Hay on the Girnock Burn and David Piggins on the Burrishoole Fishery.

Q. *How can we know the age of a salmon?*

A. The concentric rings on the scales of a salmon can reveal the age of the fish. When the young salmon first emerges from the gravel it has no scales, but very soon papillae start to appear along each side and develop quickly into small calcareous plates which, as they grow, lay down rings or "circuli" at regular intervals. During periods of rapid growth occurring in the warmer months, when the fish are feeding more actively, the rings are widely spaced, but during the winter months when feeding activity is reduced, the circuli are laid down close together, giving the appearance under the microscope of a dark band, known as an "annulus".

The annulus is complete by the end of the period of little or no feeding in the winter. Once feeding recommences in the late spring the circuli are again more widely spaced. So by counting the "annuli" or winter bands, the age of the fish can be determined.



An illustrated example of a grilse scale
(from an Atlantic salmon in Scotland)

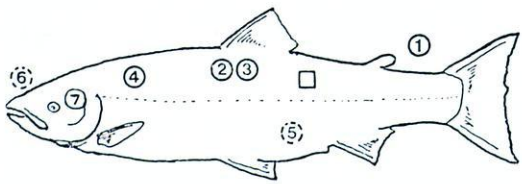
Age 2.1+
(two years in the river and more than one year in the sea)

R = River life
S = Sea life
F = Focus of scale or nucleus

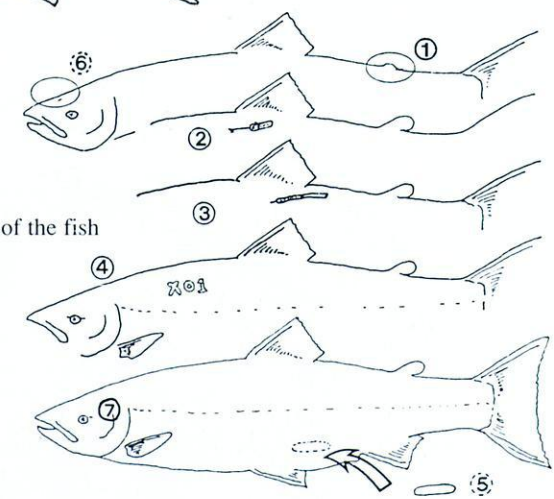
Marking of Salmon

Q. What should fishermen particularly look out for in connection with any salmon they catch?

A. Biologists who work with salmon often mark the fish that pass through their hands in any of the ways depicted below. Capture of a marked salmon should be reported at once to the appropriate fishery authority. Frequently the address is on the tag or mark. Usually the information required is: date, place and method of capture; length, weight and sex of fish and a sample of scales taken from between the dorsal and anal fins at above the lateral line.



1. Adipose fin clip
2. Carlin label tag
3. Floy or spaghetti tag
4. Freeze branding or tattooing
5. Internal tag (not visible)
6. Micro-tag inserted into the nose of the fish
7. Visual implant tag



NOTES

- Tagging should be carried out only by trained and authorised personnel.
- Fins that have been clipped do, with the exception of the adipose, regenerate.
- The adipose fin should not be removed, as clipping is internationally recognised as an indication that the fish has been micro-tagged.
- If adipose clipped fish are killed, the head (where the micro-tag is located) should if possible be sent to the nearest fisheries laboratory.

Identification of Atlantic Salmon

Q. How do you tell the difference between salmon and sea trout?

	Salmon	**Sea Trout**
General appearance	Slender and streamlined	More round and thickset
Head	Pointed	More round
Position of Eye	Maxilla (bony plate alongside mouth) does not extend beyond rear of eye	Maxilla usually extends beyond rear of eye
Colour	Relatively few spots	Often heavily spotted
Scale count (number from adipose fin to lateral line)	10-13	13-16
Fork of tail	Usually forked	Usually square or convex
Wrist of tail	Slender	Broader
Handling	Easy to pick up by Tail	Tail slips through hand

Q. What is the difference between a salmon parr, salmon smolt and a young trout?

SALMON PARR

SALMON SMOLT

TROUT

Salmon Parr

Body	More slightly built and torpedo shaped, very slender about the tail.
Tail	Distinctly forked and with more pointed lobes.
Head	Forepart shorter, gill-covers comparatively long.
Eyes	Comparatively larger and set more forward in head. A perpendicular line drawn from the back of eye will not touch the maxillary bone.
Mouth	Comparatively small, measured to the back of the maxillary bone, nearly twice the diameter of the eye.
Pectoral or Breast Fin	Longer, more slender and pointed, when laid back will generally reach to the front of the dorsal (back) fin.
Adipose Fin	No red colour.
Finger Marks	8 to 12, smoky blue in colour, even in width, well defined and regularly placed along the sides.
Spots	1 to 4 black spots on the gill-covers. No spots below the median line and not so many above. Usually one red spot between each finger mark and few, if any, elsewhere.

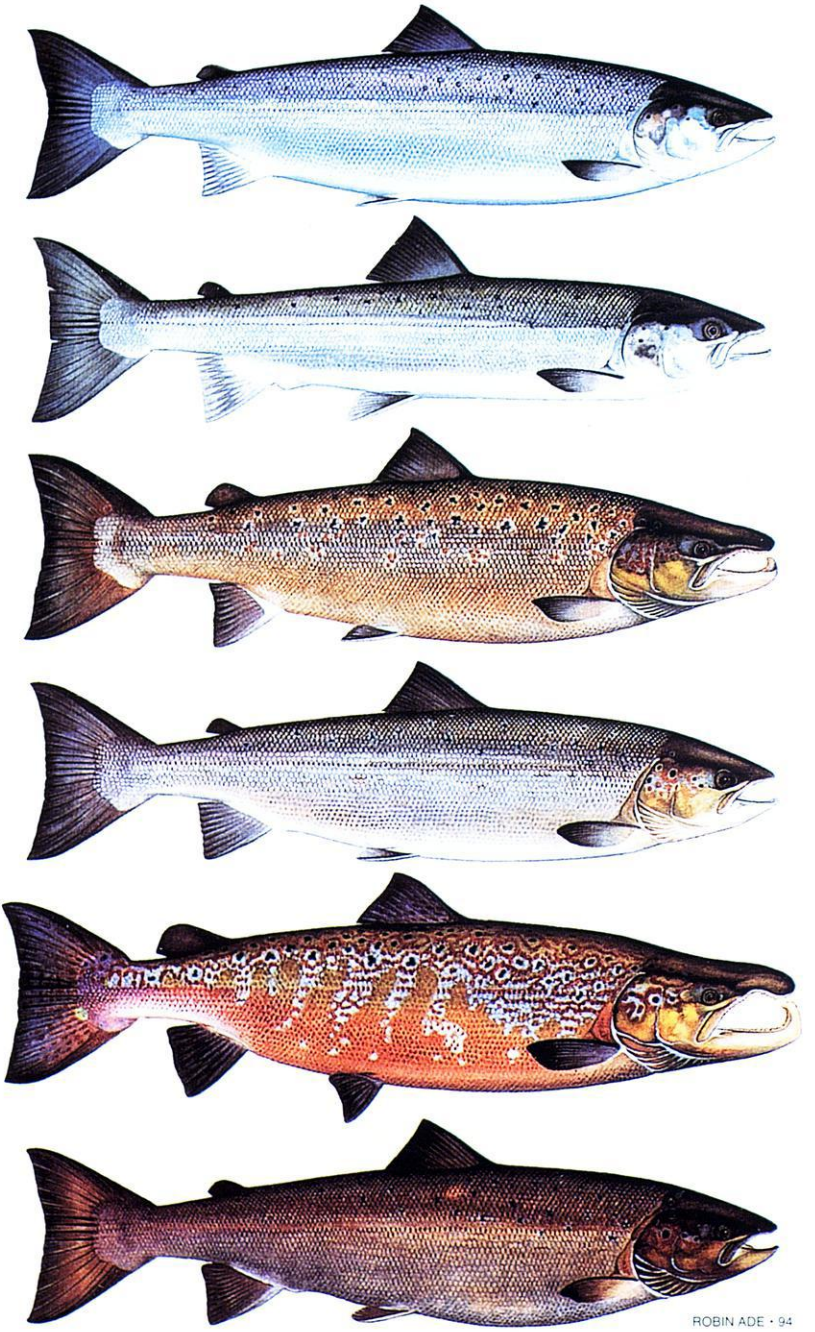
Salmon Smolts

When the salmon parr begin to migrate to the sea, usually in March, April and May, they gradually become more elongated and the fins darken. A layer of guanine crystals is laid down in the skin, rendering the body silvery in colour and obscuring the spots and finger-marks, except the spots on the gill-covers. They then become Smolts.

Trout

Body	Thicker, clumsier looking, and especially so about the tail.
Tail	Comparatively shorter and when spread out is nearly square and the points more rounded.
Head	Forepart longer and head deeper and less pointed.
Eyes	Smaller in proportion to size of head and set further back. A perpendicular line drawn from the back of the eye will either pass through or touch the maxillary bone.
Mouth	Comparatively large, measured to the back of the maxillary bone, 2_ to 3 times the diameter of the eye.
Pectoral or Breast Fin	Shorter and blunter, when laid back will not reach so far.
Adipose Fin	Generally coloured with orange or red.
Finger Marks	Not so numerous, more irregular in size, less defined and irregularly placed along the sides and lower part of the back.
Spots	Usually more than four brownish black spots on the gill-covers. Numerous spots above and below the median line. Red spots irregularly placed on various parts of the back and sides.

Q. How can salmon be recognised at the different stages of their life in fresh water?



Fresh-Run Salmon

Recognised by the pristine condition and bright silver flanks. Fish straight from salt water have loose, easily detached scales and many carry sea lice which drop off within a few days. Hen salmon (illustrated) have a tiny kype on the lower jaw but unlike cocks they retain normal head proportions while in the river.

Kelt

Kelts are salmon which have spawned. Usually identified by the thin shape, distended vent and presence of "gill maggots" on the red gill filaments, they are often encountered by anglers in spring when they regain a silvery appearance and can be mistaken for fresh run fish. Kelts must be returned unharmed to the water.

Maturing Cock And Hen

Cock. Recognised by the enlarged jaws, cocks often become coloured soon after leaving salt water. This one shows typical appearance after a few weeks in fresh or brackish water; some are more reddish, others less so, but all will have the partially developed kype.

Hen. These are usually less coloured than cocks of similar age and they never have enlarged jaws. This one will have spent a few weeks in river or estuary – note the coloured head and lack of true silver flanks.

Cock And Hen In Breeding Dress

Cock. The combination of "tartan" colours is typical although shades vary – the fully developed kype, used in fighting rivals, and the enlarged adipose fin are the most consistent indicators of maturity.

Hen. This is a summer fish – springers are often darker by spawning time while late entrants may still be silver flanked. Fully mature hens have soft, swollen bellies and spawning is imminent if they also have protruding vents.

Feeding of Atlantic Salmon

Q. Do salmon feed in fresh water?

A. As juveniles, salmon feed in their native rivers, and after smolting and migration to sea they continue to feed, principally on crustaceans and fish. Adult salmon do not feed in fresh water, although, very rarely, parr have been found in their stomachs at spawning time.

Q. What do parr feed on when they are in fresh water?

A. The larvae of aquatic insects and other aquatic invertebrates together with terrestrial insects which fall into the water.

Q. What do salmon feed on in the sea?

A. The salmon feed on a variety of small fish including capelin, herring, sand eels and sprats and the larger animals found in plankton, especially surface-living crustaceans.

Diseases and Parasites

Q. Are wild salmon attacked by diseases or parasites?

A. Salmon, both in the wild state and in fish farms, are vulnerable to bacterial and viral diseases, and also to infestation by parasites, particularly sea lice.

A common bacterial disease is Furunculosis. The furuncles or boils, which are usually fatal, are most likely to appear in wild fish in warmer months when river levels are low and fish collect in pools while waiting for more water to allow their upstream journey to continue. It has been controlled in salmon farms by vaccination.

Ulcerative Dermal Necrosis (UDN) was rife among wild fish in the late 1960s and early 1970s. Although the causative organism has never been identified, it was almost certainly a virus. It showed itself first in the appearance of small bleached areas on the head, back and tail, which were then covered in a slimy bluish-grey growth. The affected areas were vulnerable to ulceration and infection by fungus.

Infectious Salmon Anaemia (ISA) is another viral disease to which wild fish are vulnerable; it has been endemic for some years in salmon farms in Norway, and was first detected in a number of Scottish farm sites in 1998.

Sea Lice, which can only survive in salt water, are naturally occurring parasites whose presence in small numbers indicates that a salmon in the river is fresh from sea. However, they multiply exceedingly when large numbers of farmed salmon are concentrated in sea cages, and can infest wild salmon smolts encountering them in inshore waters during their seaward migration, with highly damaging results. Sea trout are even more seriously affected because, unlike salmon, they spend much of their life at sea close inshore.

Gyrodactylus salaris is a skin parasite on parr. Endemic in the Baltic, where native salmon stocks are immune, it reached Norwegian rivers via local hatcheries which had received Swedish fingerlings, with devastating results, and has since been detected throughout much of continental Europe. The parasite can live for some time in damp conditions, and stringent cleaning and disinfection of fishing tackle and clothing used abroad are necessary to prevent its ingress into the United Kingdom.

Salmon Farming

Q. Is the growth of salmon farming significant for wild salmon stocks?

A. Farmed salmon production in the North Atlantic area has increased dramatically, particularly in Norway, but also on the west coasts of Ireland and the Scottish Highlands.

A number of problems have resulted, which include:

High concentrations of sea lice, which multiply in the confined conditions of sea rearing cages. As explained earlier, migrating sea trout and salmon smolts can be very vulnerable to attack by these lice. In some rivers, wild stocks have virtually collapsed.

Escapes of farmed fish, which are known to be able to interbreed with wild fish. Since stocks in individual rivers are locally adapted to optimise their survival, this interbreeding has been shown to reduce the fitness of wild stocks for their local environment.

Pollution of the water environment, by uneaten food, fish faeces, or medications used to treat farmed salmon in their cages.

The risk of the spread of disease or parasitic infestation, such as Infectious Salmon Anaemia and *Gyrodactylus salaris*.

Q. Can anything be done to counter these problems?

A.. Codes of best environmental practice can be developed and improved. These include use of the principle of integrated sea louse control, through co-ordinated fallowing within sea lochs and bays to break the cycle of sea louse survival, followed by co-ordinated treatment to prevent cross infestation. Legislation to enforce these codes is essential.

Other Problems

Q. What other problems affect salmon stocks?

A. There are a number of factors which have had an effect on salmon stocks, as shown in detail on the following pages. Some, such as predation by other species, have already been mentioned. Others include:

Pollution of rivers and silting up of spawning gravels

Obstacles to migration, such as dams

The effect of fisheries which inadvertently take salmon ("by-catch") or which remove the salmon's natural food in the sea.

Climatic changes which are affecting the salmon's ability to grow and survive during its time in the sea.

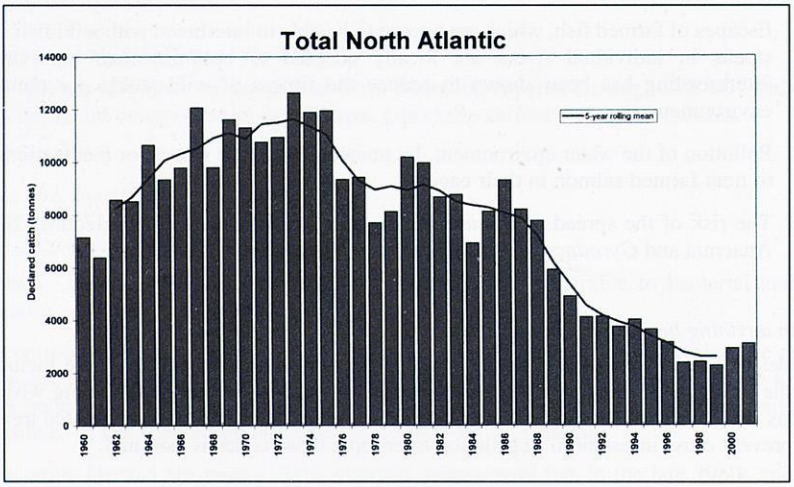
High seas and coastal "interceptory" mixed stock fisheries which take fish from more than one river population, thus denying the ability to manage the exploitation of individual river stocks on a local basis to maintain stock levels.

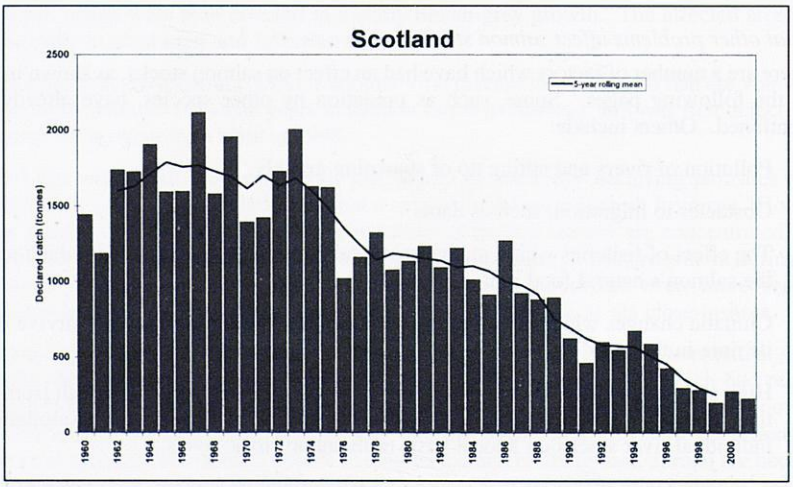
These, together with measures that need to be taken to address them, are covered in more detail in the final pages of this book.

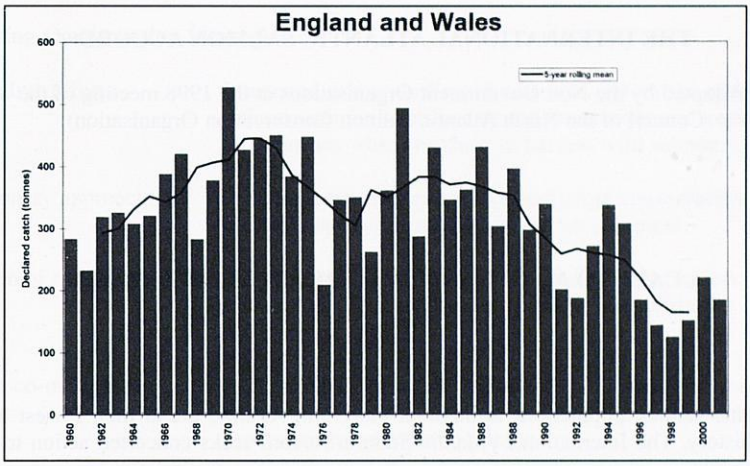
The state of wild salmon stocks

Q. How have salmon stocks changed over the years?

A. All around the North Atlantic, stocks have been in general decline during a number of years. Some stock components, such as early-running or "spring" fish, have suffered particularly badly. Actual stock levels are difficult to estimate, except on rivers with reliable counting facilities, but catch figures can be used to give an indication, particularly of trends. The decline can be readily seen in the figures which follow.






England and Wales
5-year rolling mean
Declared catch (tonnes)
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100
200
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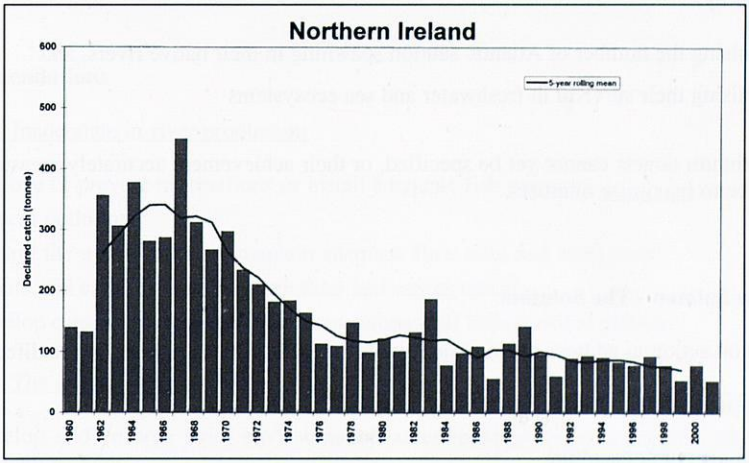
Northern Ireland
5-year rolling mean
Declared catch (tonnes)
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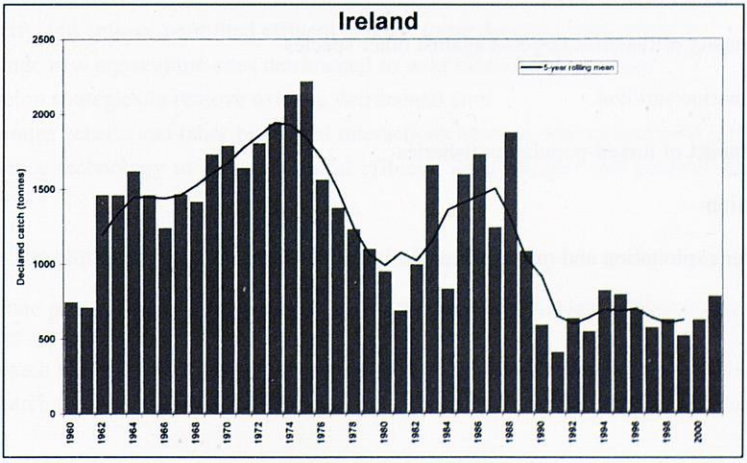
Ireland
5-year rolling mean
Declared catch (tonnes)
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THE INTERNATIONAL ATLANTIC SALMON ACCORD

(Adopted by the Non Government Organisations at the 1998 meeting of the Council of the North Atlantic Salmon Conservation Organisation)

A CALL TO ACTION TO SAVE THE ATLANTIC SALMON

The Aim

Wild Atlantic salmon populations throughout the North Atlantic are at their lowest levels in recorded history. The International Atlantic Salmon Accord seeks concerted action to reverse this decline by:

- Optimising the number of Atlantic salmon spawning in their native rivers, and
- Optimising their survival in freshwater and sea ecosystems

Where optimum targets cannot yet be specified, or their achievement accurately measured, the aim must be to maximise numbers.

Saving the Salmon - The Solution

Conservation action to address seven major issues that affect the salmon during its lifecycle:

1. Inadequate in-river production
2. The impact of aquaculture
3. The impact of fisheries targeted against other species
4. Low marine survival
5. The impact of mixed-population fisheries
6. Predation
7. In-river exploitation and management

Underlying Conservation Strategies

Co-operative efforts:	Integrated and co-ordinated action to restore the quality of the Atlantic salmon's freshwater and sea ecosystems is needed from all countries which produce or harvest wild salmon.
Precautionary approach:	Governments must encourage and adopt conservation measures even where supporting data is not yet complete.
Reduction of mortality:	Harvesting of salmon outside their native rivers must be eliminated. River fisheries must allow adequate spawning escapement.
Research co-ordination:	International research effort and funding is required to understand the direct and indirect impacts of the ocean ecosystem upon Atlantic salmon.

Recommendations

Issue 1 – Inadequate in-river production

- Remove or prevent obstructions or install adequate fish passage
- Prevent pollution
- Control the use of water to maintain adequate flow rates and river levels
- Initiate and continue habitat restoration and enhancement
- Develop catchment-based salmon management and enhancement policies

Issue 2 – The impact of aquaculture

- Develop and enforce strict environmental assessment procedures for new and existing aquaculture sites
- Specify and enforce permitted effluent and sea louse density levels
- Exclude new aquaculture sites detrimental to wild salmon and sea trout
- Develop strategies to remove existing detrimental sites
- Minimise genetic and other biological interactions between farmed and wild salmon
- Advance technology to reduce harmful effluent, deter escapes and control disease and parasites

Issue 3 – The impact of fisheries targeted against other species

- Institute precautionary management regimes for industrial fishing in the Atlantic salmon's forage areas
- Research the impacts of industrial fishing on the salmon and its marine ecosystem
- Research the impact on salmon of fishing of other species for human consumption

Issue 4 – Low marine survival

- Develop and implement tracking technologies, ocean surveys and monitoring to determine salmon movements and feeding at sea
- Research the direct and indirect impacts of the ocean ecosystem on Atlantic salmon
- Use these data to develop better predictive models of salmon abundance, in order to facilitate proactive management

Issue 5 – Impact of mixed-population fisheries

- Negotiate permanent closure of mixed-population fisheries in territorial waters with fair compensation
- Negotiate permanent closure of the commercial salmon fisheries of Greenland and Faroe Islands through compensation, or the development of alternative fisheries
- Implement an international surveillance system to detect and prosecute unauthorised fishing for Atlantic salmon in international waters

Issue 6 – Predation

- Document the effects of bird and mammal predation in rivers, estuaries and the open sea, and develop optimum practicable means of controlling damage
- In the interim, permit appropriate local or regional measures based on fair assessment of damage

Issue 7 – In-river exploitation and management

- Develop and implement catchment-based salmon management
- Manage salmon exploitation on an environmentally sustainable basis
- Conduct population and migration assessment to guide management
- Implement precautionary regulation of exploitation where needed
- Develop catch and release as a management tool

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