## Lower survival in the ocean

The survival of salmon in the ocean has declined by almost 70% since 1970. The decline took place despite a substantial reduction of the fisheries for salmon at the different feeding grounds in the ocean.
As a result of this trend, some of the populations are faced with near-extinction. It is suspected that there are many causes for this decline. Most of these causes already have been mentioned above.
Without the substantial buy-outs and compensations of the commercial fisheries, supported and agreed by NASCO (North Atlantic Salmon Conservation Organization and executed by the non-governmental NASF (North Atlantic Salmon Fund), survival of Atlantic salmon would have been even lower as it is now.

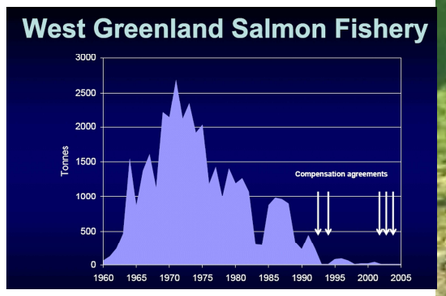
## Importance for angling

The Atlantic salmon has for centuries been not only an important species for the kitchen but also the focus of recreational angling and sport fishing. Over the last century the importance of wild salmon for recreational rod and line fishing has grown substantially to the point where recreational angling and sport fishing for salmon now surpasses commercial fishing in economic terms. Local and regional communities – especially in regions with few economic activities and low job opportunities – have become very dependent on the tourism created by recreational angling and sport fishing for Atlantic salmon.
Fishing for salmon – especially with fly fishing gear – is considered the pinnacle of recreational angling.
Recreational anglers are not only utilizing this salmon resource, but are also in the forefront of most conservation and restoration efforts for this species. Some angling organizations not only monitor the returning salmon, but also run small to medium-sized hatcheries to provide fry, parr or smolts for the restocking programs.

## What does EAA want?

- No mixed stock (intercepting) commercial fisheries for salmon in both national and international waters;
- Reduction of industrial fisheries for prey species (e.g. capelin, sandeel and krill) by setting stringent quotas;
- Promote buy-out of commercial salmon fisheries in estuaries and coastal waters;
- Continuation of the buy-outs of the commercial salmon fisheries at the feeding areas (west of Greenland and near the Faroer Islands). There should be no reoccurrence or revival of these fisheries!
- Commercial salmon farms should take measures:
  - to prevent escapes of salmon from farms (e.g. by a more rigid construction);
  - to reduce the sea lice problem by means that have no detrimental effects on the environment (by using biological methods instead of medicines or chemicals).
- On the long term: Only land based commercial salmon farms should be allowed that use closed systems;
- A broad international research should start on the occurrence and effects of a number of chemicals or pollutants from diffuse sources and effluents from sewage water treatment facilities on salmon (their reproduction, their migration etc.);
- All migration barriers that have lost their practical use, should be broken down;
- All existing migration barriers (dams, weirs and sluices) should be provided with effective fish passages for upstream and downstream migration of salmon;
- All existing hydropower stations should be evaluated for their environmental impact.
- All hydro power stations should be scrutinised for:
  - their economic viability (without public funding);
  - their contribution to the overall energy supply;
  - their impact on the river's flow, ecological status and all life within it.
- No new hydro power stations should be built on rivers with a salmon population or on rivers that possess the potential to become a good salmon river.

Icebergs at the Greenland feeding area.




Despite massive buy-outs of the Greenland fishery, the survival in the Atlantic Ocean has steadily declined. Without these buy-outs, survival would have been even lower.

A returning male salmon is caught by electrofishing gear.

A female which has returned to a tributary the Rhine river is stripped of her eggs in a hatchery that is run by sport anglers.

EAA
European Anglers Alliance

# Atlantic salmon

## Biology and threats

## The Atlantic Salmon

The Atlantic salmon (Salmo salar) has for ages been the icon for migrating fish as well a symbol of vitality. His name means 'the jumper' in Latin, referring to the legendary capacity to jump over water falls that are insurmountable for most other fish species.
Since about 40 years the Atlantic salmon populations are declining in all its original habitats. Much earlier – around 1950 – there had been the demise of the once famous populations of the rivers Rhine and Meuse. It proved to be a sad warning of more to come. The downfall of the Atlantic salmon in these great European rivers should have been a forewarning for everybody. However, its causes were so complex and they were not very well understood. Actually, they were never thoroughly studied since nobody seemed to pay attention.
The current decline of Atlantic salmon worldwide is also caused by many factors, and consequently there lurks the serious danger that because of the sheer complexity of all these problems, no actions are taken to correct them.
With this position paper the European Anglers Alliance wants to present an overview of the main problems confronting the Atlantic salmon and to suggest some possible solutions for these problems.

## Life cycle

In late autumn or winter, Atlantic salmon spawn on the gravel beds of rivers and streams that ultimately flow into the sea. February to June, about three to seven months – depending on the water temperature - after the eggs were deposited, the young salmon hatches and after another month or two leaves the safety of the gravel and embarks on a hazardous journey out into the open stream. During the course of the next years, the young salmon grows, moving downstream to deeper waters and eventually – after one to four years - makes its way out to the sea as a "smolt". There it will stay for at least one year, feeding on smaller fish or crustaceans and growing at a very fast rate. Most salmon however stay two to three years in the sea or ocean.
Salmon that already return in the summer of the year following their journey into the sea, are called "grilse". Salmon that stay two or more years in the sea are called 'multi sea winter' salmon or MSW salmon. So after one to three years in the sea, the adult salmon begins a return journey which will bring it to the stream in which it was born. It swims gradually upstream where it spawns and thus begins the life cycle of the next generation of salmon.

## Migration barriers

Despite the reputation as a great leaper, there are man-made barriers that are insurmountable for even the Atlantic salmon. Some other barriers are less tough, but seem to slow him down during the migration in such a way that adult salmon do not reach the spawning grounds in time or even turn back to the sea instead of taking part in the spawning process. On the other hand barriers can prevent young salmon (smolts) from reaching the estuary and the sea.
Migration barriers and hydro power stations also make salmon – both young and adults - more vulnerable for predation by fish, birds or mammals.

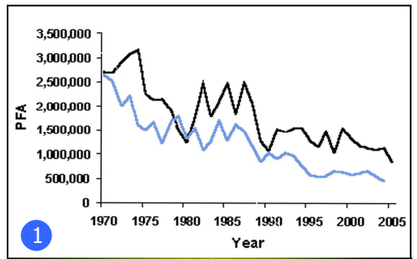
Man-made migration barriers come in many guises:

- Weirs, dams and sluices for shipping, commercial fish farms, water management and flood control;
- Weirs and dams for hydropower and irrigation;
- Large bodies of stagnant water created by the impoundments.

People need weirs, dams and sluices for their safety, for transport and for the production of food as well as energy. But these man-made barriers can turn free flowing rivers into obstacle courses for many migratory fish species. In most cases these structures were built without any regard for the needs of these fish. With the help of fish passages salmon can navigate most of these barriers. Other solutions - depending on the problem - include: fish lifts, guidance systems and a different sluice management. Most preferable are fish passages with full water flow capacity.
Hydropower is a problem in its own right (also see the EAA position paper on hydro power). Hydro power stations (and the dams or weirs that come with it) not only constitute serious barriers for upstream and downstream fish migration, but also kill downstream migrating fish, like young salmon, in their turbines right away.
An additional problem constituted by hydro power and the necessary impoundments are the profound changes they bring about in natural river systems.

## Fisheries

Wild Atlantic salmon are valued as game fish and as a fish for the table. The catch by commercial and recreational fishermen may have an impact on salmon populations. Fishing for salmon is done at many places and carried out in many different ways. In most cases recreational angling for Atlantic salmon generates substantial higher financial rewards for the local communities than does commercial fishing and with less negative impact on the stock.
In many European countries - the North Sea region in particular, including the river systems of the Rhine and Meuse - the Atlantic salmon is protected by EU Directives and national laws. In some places all salmon caught there by rod and line or nets must immediately be released.
Commercial fishing in rivers – especially for fresh-run salmon in the lower parts – used to be economically very important, but it has in most countries given way to the much more profitable recreational angling and sport fishing for salmon. The economic value of a salmon caught by sportfishing can be up to 30 times the market value of a commercially caught salmon (counting investments in tackle, travelling, lodging, food, licences and guiding). To protect the resources even further – ensuring that enough salmon can take part in the spawning process -, on some rivers recreational and sport fishing are made subject to additional management like catch and release. On other rivers catch and release is practiced on a voluntary basis with very good results. On some rivers even more fine tuned management tools are introduced, like increased minimum sizes, slot sizes or catch and release of female fish only.
To promote recreational angling and sport fishing for salmon as well as protect the spawning population of salmon it is important to ban all commercial fishing for salmon in the rivers.
Commercial fishing also takes place in river deltas, estuaries, coastal waters and the sea. Especially the mixed stock fisheries (MSF), where salmon originating from several rivers of many countries are caught, are very harmful because in many cases these fisheries catch salmon from already depleted populations..
The commercial fishing for salmon on their feeding grounds in the Atlantic Ocean is nowadays severely limited. Unfortunately this had little visible effect on the declining survival of the Atlantic salmon in the Ocean. (At least it could not prevent a further decline)
The commercial fishing for prey species or other fish in the northern Ocean does however still harm the Atlantic salmon in a direct as well as in an indirect way. Salmon are by caught in herring and mackerel fisheries as well as in the industrial fishery for fish food. In the large scale industrial fishery for capelin, sandeel, herring, barracudinas, shrimp and krill, the most important prey species for Atlantic salmon are removed from the food chain, possibly leading to food shortages for the salmon and lower survival rates in the ocean.









## Salmon farms

Many independent studies show a direct relationship between the increase of commercial salmon farms and the decline of wild salmon populations in nearby rivers.

The effects of salmon farms on wild salmon are manifold:

- Large numbers of escaped salmon
  - competing on the feeding grounds with wild salmon;
  - interbreeding and genetically 'polluting' the unique characteristics of wild salmon;
- Massive infestation with sea lice from salmon farms - hampering the survival of wild post smolts.
- Increased industrial fishery on prey species of wild Atlantic salmon for the production of food pellets for farmed salmon.

One positive effect of salmon farms has been a reduction of the market value of wild salmon, enabling cheaper buy-outs of commercial fisheries.
The future of aquaculture must be founded on modern technologies. Fully recycling systems ('closed' systems) for fish production are already applied in a few land based fish farms, using fresh water or salt water. Waste water treatment is done by sophisticated purification installations, and the discharge from these fish farms is as close to environmentally neutral as possible. Salmon farming in closed systems could also solve all but one of the above mentioned problems (the abstraction of prey species from the Ocean).

## Pollution

Industrial pollution has been one of the causes for the demise of Atlantic salmon in the Meuse and Rhine Rivers. Pollution is nowadays recognized as one of the main threats for wild salmon. In many river systems the treatment of industrial and sewage waste water is mandatory and well enforced. Consequently, the large scale water pollution seems a thing of the past in most countries.
Now the main pollution that remains, stems from diffuse sources like residues from insecticides and herbicides. For instance, the chemical cypermethrin in the so-called 'sheep dips' can be very harmful for wild salmon, reducing their survival and their ability to orientate themselves during their migration.

## Climate change

It cannot be denied that the climate in the North Atlantic area is gradually changing. Average yearly water temperatures as well as air temperatures are increasing and air pressures at Iceland and the Azores are changing. All these factors can have considerable effects on sea currents, ocean weather and all life forms in the Atlantic Ocean. Warmer temperatures in the Atlantic Ocean and other changes may lead to lower food availability and behavioural changes in salmon, ultimately leading to lower survival of salmon in the ocean.
Climate change also has effects on the fresh water phase in the life of salmon. Warmer summer water temperatures in rivers mean a lower survival of young salmon in fresh water and negative effects on the migration of smolts and adults in late spring or summer. But the effects of climate change on the weather are not uniform and can differ from year to year. Climate change can also mean more rainy (wet) summers. And more rain in summer can mean better survival and better conditions for migration for smolts as well as adult salmon.
We expect to see substantial differences in the year-to-year survival of salmon as a result of climate change.

**1.** The decline of the pre-fisheries abundance (PFA) of salmon in southern rivers (blue = MSW-salmon – two or three years at sea; black = grilse – one year at sea). **2.** After one to three years on the ocean, adult salmon return to their river of origin to spawn. **3.** After more than two months the fry hatches from the egg. **4.** The migration routes of the salmon at sea. They mainly congregate at feeding areas near Greenland and the Faroer Islands. **5.** A salmon 'parr' with the distinctive blue-grey 'finger prints' and the long pectoral fins. **6.** Some hydro power stations have fish passages, but very few have effective fish guidance systems to prevent mortality.