Atlantic Salmon (Salmo salar) | Braddan Atlantagh

Biodiversity Action Plan | Cummey Yannoo Beiyn-Feie

Background

Atlantic salmon (*Salmo salar*) is one of the largest of the *Salmonidae*, inhabiting most Manx rivers that provide gravelly, well oxygenated, riverbeds, free from pollution. Their populations are monitored by the Department of Environment, Food and Agriculture (DEFA) since 2003. They are one of the most prized and exploited fish species worldwide within the sports fishing industry and increasingly as a farmed species in many countries worldwide.

Description

Generally, Atlantic salmon can grow up to 150 cm in length and weights of 39 kg or more. With two dorsal fins, the second (Adipose) is situated near the tail and is small and fleshy with no fin rays. With sleek, streamlined bodies, their tail fin is slightly forked. An anadromous species, they begin their life in freshwater before migrating to the ocean to feed and grow usually for one year but can remain at sea more years before returning to freshwater to spawn in rivers. They are also known to return several times over many years and have an average lifespan of between 4-10 years. Colour variations are dependent on habitat and range. When at sea, the dorsal area is silvery and steel blue-green, the sides silvery, the belly white and there are dark spots along the lateral line.

Adult salmon lose their fresh appearance as they slowly make their way upstream. The silvery colour is lost and the fish becomes a more mottled brown, the spots darken, become larger and are ringed by a paler colour. Salmon that mature after one year at sea are called 'grilse' and usually return to rivers in the summer/autumn. Fewer, older fish that return after multiple winters at sea are often called 'springers' as they may return to rivers in the spring or early summer. Males often develop a hook on their jaw called a 'kype'. Juveniles undergo smolting; morphological and physiological changes which allow them to adapt to life in sea-water.

British Isles Distribution

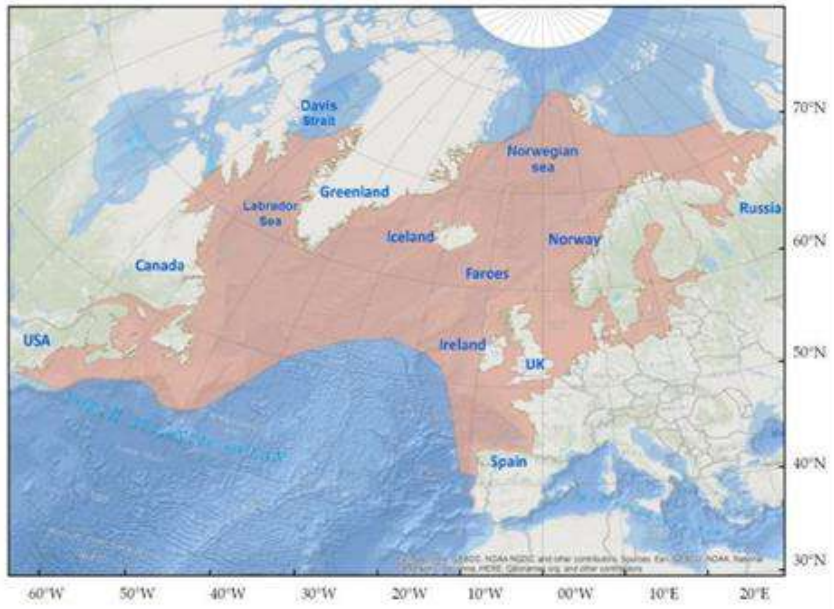


Figure 1: The North Atlantic with the geographic distribution of Atlantic salmon indicated in light red (Maoiléidigh, 2018)

The Atlantic salmon's geographic range includes eastern North America regions, North Atlantic Ocean and rivers around the Atlantic coasts of Europe. European and North American populations of Atlantic salmon intermix while living in the ocean, where they share summer feeding grounds around the Norwegian Sea and the coast of Greenland.

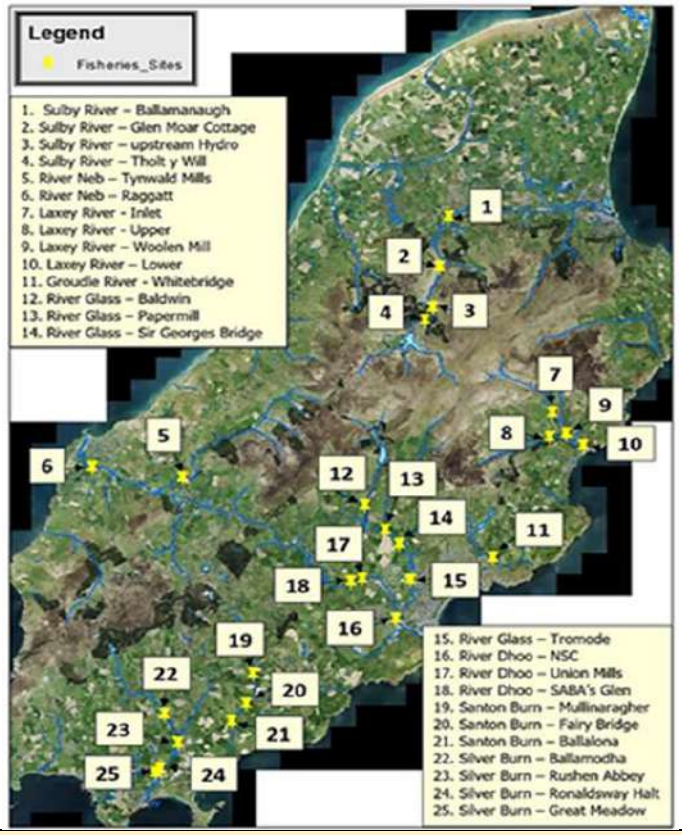
The movements of post-smolt and the distribution and habits of salmon while they are at sea are poorly understood. International telemetry programme encouragement using acoustic tracking research of tagged smolts hope to provide more data about their movements.

Isle of Man Distribution

Initiated by the Department of Environment, Food and Agriculture's (the Department/DEFA) Fisheries Division, the 'Juvenile Trout and Salmon Monitoring Programme' has led to the establishment of 25 'key sites' with data published up to and including surveys conducted in 2020. The survey aims to identify trends in the Manx juvenile population, provide an overview of the status of the population in a catchment, and identify those parts of the system that are under performing.

Although not all watercourses within the Isle of Man contain salmon populations, all main rivers and a large proportion of smaller water courses do, including some classified as ditches.

Juvenile Atlantic salmon are found with varying prevalence throughout all survey sites, however consistent population decline at various survey sites appear to support concerns of an international decline, with various reasons behind this.



Habitat

During its marine phase, adult Atlantic salmon develop and gain rapid growth as they inhabit pelagic zones, migrating thousands of kilometres to the North Atlantic Ocean around the Norwegian Sea and the coast of Greenland. Utilising rivers for reproductive and nursery phases, juvenile salmon fry and parr require rivers with clean, well oxygenated water, cool temperatures and stony river beds with aquatic vegetation cover where they feed primarily on freshwater invertebrates. Spawning areas in rivers require deep gravels with a consistent supply of well oxygenated, clean water.

Ecology

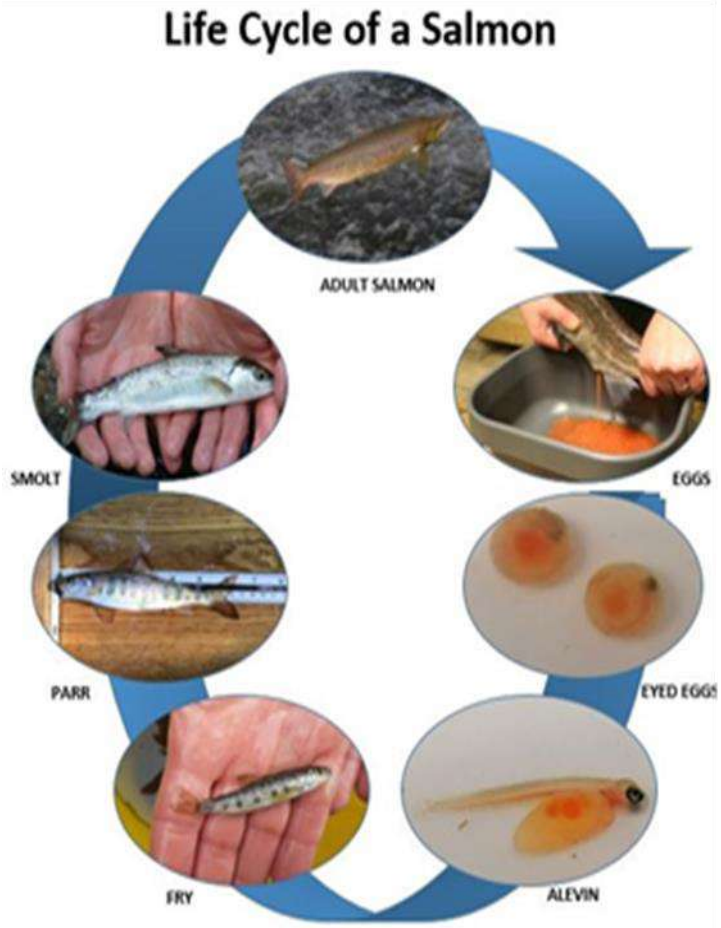
The diet of Atlantic salmon depends on their age. Young salmon inhabiting freshwater environments eat insects, invertebrates, and plankton. When they're in the ocean, young and adult salmon eat a wide variety of prey, including fish such as capelin, Atlantic herring, sand lance, barracudina and lanternfish, crustaceans such as amphipods and euphausiids or "krill", cephalopods like squid and octopus and varieties of polychaete worms.

Commuting

Smolts from the UK move north with the prevailing currents after leaving rivers and that high concentrations of post-smolts have been identified in the Norwegian Sea which has been postulated to represent the summer 'nursery area'. Thereafter, the distribution of the fish likely varies both with the time fish might spend at sea before returning and their region of origin. Atlantic salmon from the Isle of Man are considered to migrate to the same regions as fish from the UK. European and North American populations of Atlantic salmon intermix while living in the ocean, where they share summer feeding grounds around the Norwegian Sea and the coast of Greenland.

Breeding

Atlantic salmon usually spawn between November and December in gravelly, well-oxygenated rivers although this may occur earlier or later depending on factors such as the size of the fish and latitude of the river. The female salmon beats her tail against the gravel to dig out a shallow nest for eggs called a 'redd'. During spawning, the male fertilise eggs as the female lays them in the redd. Spent fish that make their way downstream to sea after spawning are known as 'kelts'. Juvenile salmon usually stay in the river for two to three years.



Appearing with an external yolk sac, newly hatched Salmonids are called 'alevins'. These develop into fry in their first year and then into parr in their second year and subsequent years in the river. Appearing similar to juvenile brown trout, fry are generally more silvery in colour. Parr often have well-defined dark blotches called 'parr marks' along their sides. Salmonid fry and parr require rivers with clean, well oxygenated water, cool temperatures, stony river beds and adequate cover provided by aquatic vegetation. Parr feed primarily on freshwater invertebrates.

As salmon parr prepare to migrate to sea from the river, they become 'smolts', turning more silver in appearance and undergoing physiological changes to prepare for saltwater conditions (smoltification). Salmon have a remarkable homing instinct. They migrate from the Isle of Man to their feeding grounds which could potentially be thousands of kilometres away around the Norwegian Sea and the coast of Greenland, before migrating back mostly to the rivers in which they were hatched, to spawn after one or more winters at sea.

Legal protection

Internationally, the Isle of Man is a member of the Oslo and Paris Convention (OSPAR), the mechanism by which 15 Governments & the EU cooperate to protect the marine environment of the North-East Atlantic. Although the Isle is not a member of the North Atlantic Salmon Conservation Organisation (NASCO), OSPAR is in agreement with NASCO, prohibiting fishing for salmon within marine environments beyond areas of fisheries jurisdiction and, in most areas of the North Atlantic, beyond twelve nautical miles of the baselines. Efforts have led to contracting parties' agreement to full or partial prohibitions, such as in the United States where commercial and recreational fishing for wild sea-run Atlantic salmon is currently illegal.

Within the Isle of Man, the Department of Environment, Food and Agriculture (DEFA/the Department) within the Isle of Man Government has a statutory duty for the "supervision and protection of inland and sea fisheries" and for "fostering the establishment and development of such fisheries" under the Fisheries Act 2012. The Fisheries Division within DEFA has responsibility for the improvement and protection of all freshwater fisheries, the regulation of fishing and the prevention of illegal exploitation. The Fisheries Division also has powers to help ensure the unobstructed migration of salmon from the sea to their spawning grounds, to control the movement and introductions of freshwater fish species and to monitor fishing and fish stocks.

Threats

The wide geographical extent of salmon migration and common patterns that have emerged have long been considered to indicate that broad-scale changes in the marine environment are the main cause of the observed decline. Unknown severity of pressures such as marine development and 'spatial squeeze' acting on salmon are too uncertain to estimate, but is likely to have an impact. Data on returning Manx adult salmon populations necessitates the instalment of fish counters.

Physical Barriers

Fish barriers to migration (further exacerbated by low and high water flow) including dams, culverts, weirs and marina entrances. Where natural fish passage in rivers have been altered, fish concentrate making them easy prey for predators and anglers. High concentrations of spawning adults unable to move beyond barriers may cause excessive redd disturbance due to reduction in suitable spawning habitat.

Pollution

Water pollution, such as nutrient and organic matter enrichment and hazardous substances from urban and agro-industrial activities affect Atlantic salmon spawning grounds and their reproductive success (e.g. PCBs in substrates, acidification). Examples of Manx agricultural pollution include leaks from slurry tanks, mistimed or poorly applied organic and inorganic fertilisers on fields, enforcement constraints and lack of suitable riparian buffer zones

Habitat Degradation

Habitat alteration or loss especially of spawning and juvenile grounds, resulting from riverbed engineering schemes and hydrological management (e.g. for flood defence or navigation), exacerbated by drought, compensation flow reduction from controlled catchments and water abstraction.

Unsustainable Fishing

Fisheries exploitation both marine and freshwater by commercial and recreational fishing impact adult salmon populations including incidental by-catch of Atlantic salmon at sea and targeted fisheries in key areas including overfishing of Atlantic salmon food sources (e.g. sand eel).

Aquaculture

Farmed salmon may increase disease and parasite spread on contact with wild populations and genetic concerns from accidental farm escapes.

Non Native Invasive Species

Non-native species are also contributing to higher levels of competition such as in the case of the invasive Pacific pink salmon to European and UK waters (one confirmed case in Manx waters in 2021).

Climate Change

Severity, frequency and atypical seasonality of extreme events influence key salmon life cycle periods that impact survival, growth rates and distribution, such as the movement of migration routes extending farther north within marine environments or impacts to spawning success from severe spates (sudden flood waters) and drought within freshwater.

Reason for BAP
The 'Juvenile Trout and Salmon Monitoring Programme' has identified declining trends in the Manx Atlantic salmon juvenile population to low density levels.
Aims
The aim of this BAP is to ensure the sustainability of Atlantic salmon populations within the Isle of Man inland and territorial coastal waters, maintaining its current population range, maintaining and (where possible) improve fish passage where barriers exist within Manx rivers and increasing productivity.
Linked BAPS

It is advised that this action plan is taken forward, linked to protections of species within Manx Marine Nature Reserves and designated features allocated to other anadromous species such as the European eel.

- Riparian habitat

Delivery Options	**Active**	**Challenges**
Intervention for Population Recovery ○ Supportive breeding and stocking of salmon fry.	Yes	Success in capturing wild run male & female adult salmon. Operation on salmon hatchery-budget/staffing.
Education ○ Raising awareness of the status of Atlantic salmon and threats among relevant sectors, competent authorities and the general public. ○ Improving scientific communication and information exchange with professional bodies on Atlantic salmon (NASCO, OSPAR, Institute of Fisheries Management-IFM, and the Centre for Environment, Fisheries, and Aquaculture Science-CEFAS).	Yes	Disinterest in conservation by developers/architects/ designers, farmers, policy makers and landowners.
Fish Passage Improvement ○ Target barriers for improving fish passage on the Island's salmon rivers.	Ongoing	Resources, landowner permission, budget.
Recreational Fishing Management ○ Manage salmon angling practices to assist salmon populations consistently scoring poorly over extended periods, such as up to 5 years. ○ Zonation of areas to prevent disturbance from exploitation and habitat degradation.	Ongoing	Negative public response to management measures. Funding. Effectiveness of the new body.
Habitat Protection and Restoration ○ Enhancement and protection of riparian and watercourse areas at risk from degradation by natural and anthropogenic causes, under the Fisheries Act 2012 and Wildlife Act 1990 through incentives like the Agri-Environment Scheme (AES).	Ongoing	Budget and staff resources. Disinterest in conservation by developers/architects/designers/ farmers and landowners.

○ Determine Atlantic salmon range within Manx watercourses across the Island. ○ Unregulated water extraction and boreholes.		High stakeholder activity within small catchments and a lack of catchment management plans.
Salmonid Monitoring ○ DEFA Fisheries currently conduct monitoring of juvenile Salmonids around the Island at over 30 survey sites. ○ Monitoring of returning adults is not currently undertaken but established as data that will provide what impact marine environments have on Manx salmon.	Yes	Staffing, high water, leaves, equipment failure, training, work levels, funding for fish counters including installation.
Salmon Sensitive Development ○ DEFA Fisheries currently conduct guidance to 'in river' work from planning applications and Government led initiatives, limiting activities by legislative statute under the Fisheries Act 2012 and Section 18 consent.	Ongoing	Budgets, disinterest by developers/architects/designers.
○ Annual review and update of this document.	Oct 2024	

Delivery Plan
Action
Intervention for Population Recovery ○ Continue working to provide supportive breeding and stocking of salmon fry on rivers surveyed as poor or less over consecutive 5 years.
Education ○ Continue raising awareness of the status of and threats to Atlantic salmon populations internationally and on Island among relevant sectors, competent authorities and the general public.
Fish Passage Improvement ○ Guide any new river development to current barriers to fish passage, promoting (where possible) installation of rock ramps and fish passes. ○ Endeavour to clear blocked weirs, culverts or other regions within watercourses.
Recreational Fishing Management ○ Work towards establishing a Freshwater Fisheries Statement to replace the Freshwater Fisheries Strategy 2015.
Habitat Protection and Restoration ○ Provide guidance and support on projects and incentives among relevant sectors, stakeholders, competent authorities and the general public that relate to and require a level of sensitivity towards Atlantic salmon issues. ○ As resources and climate permit, survey presence/absence of unknown watercourses to establish Atlantic salmon range on the Island. ○ Maximise usage of statutory (ASSIs) and non-statutory (Wildlife Sites) designations.
Salmonid Monitoring ○ As resources and climate permit, monitor juvenile Salmonids. ○ As resources and climate permit, survey presence/absence of unknown watercourses to establish Atlantic salmon range on the Island.

- Investigate the establishment of fish counters to monitor migratory fish populations within Manx waters.

Salmon Sensitive Developments

- Provide guidance and support of 'in river' works to establish Salmonid sensitive methods and designs from planning applications and Government led initiatives, limiting activities by legislative statutes.
- Work towards educating, creating or improving on policies, applying best practice to planning and development for the preservation of Salmonids and their habitats.