

# **Salmon and Freshwater Fisheries**

**John Armstrong**



**“Salmon is the king of fish... yet, now,  
their very survival is at risk”**

**Sir David Attenborough 2019**



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**“We will do everything possible to  
safeguard the future of wild salmon”**

**Scottish First Minister Nicola Sturgeon 17 January, 2020**



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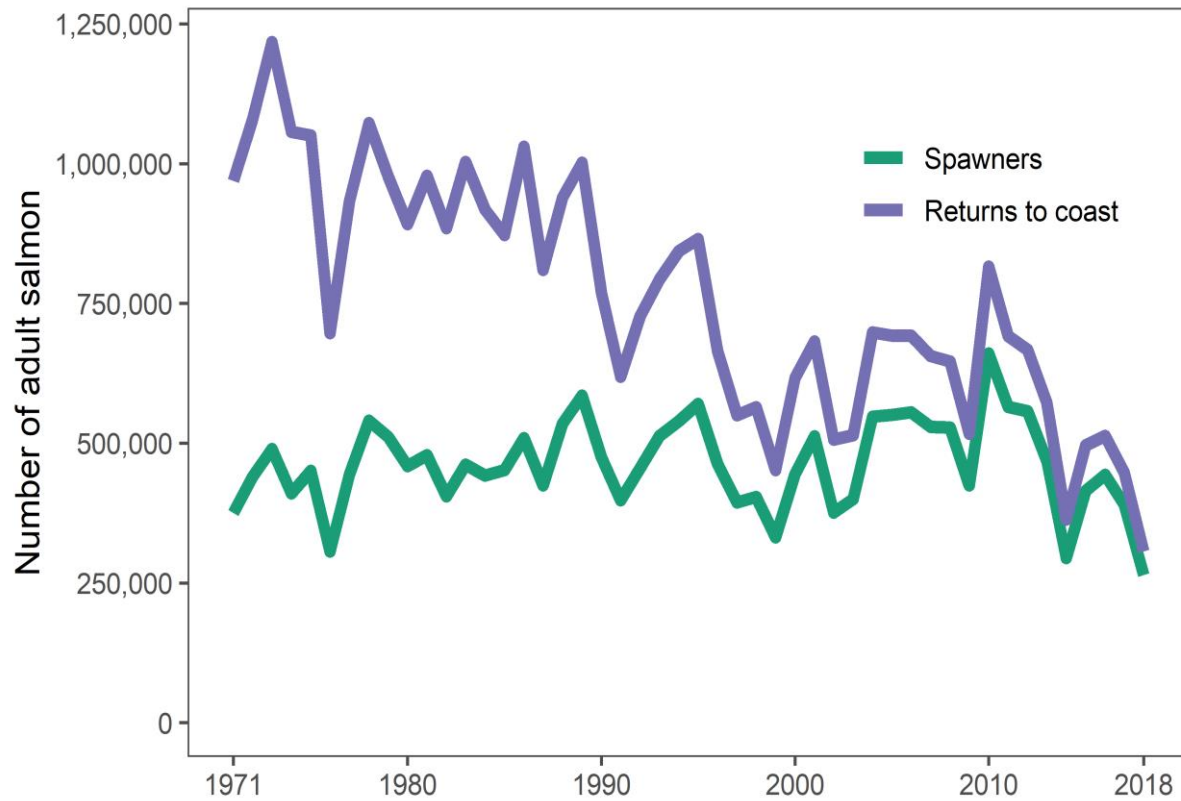
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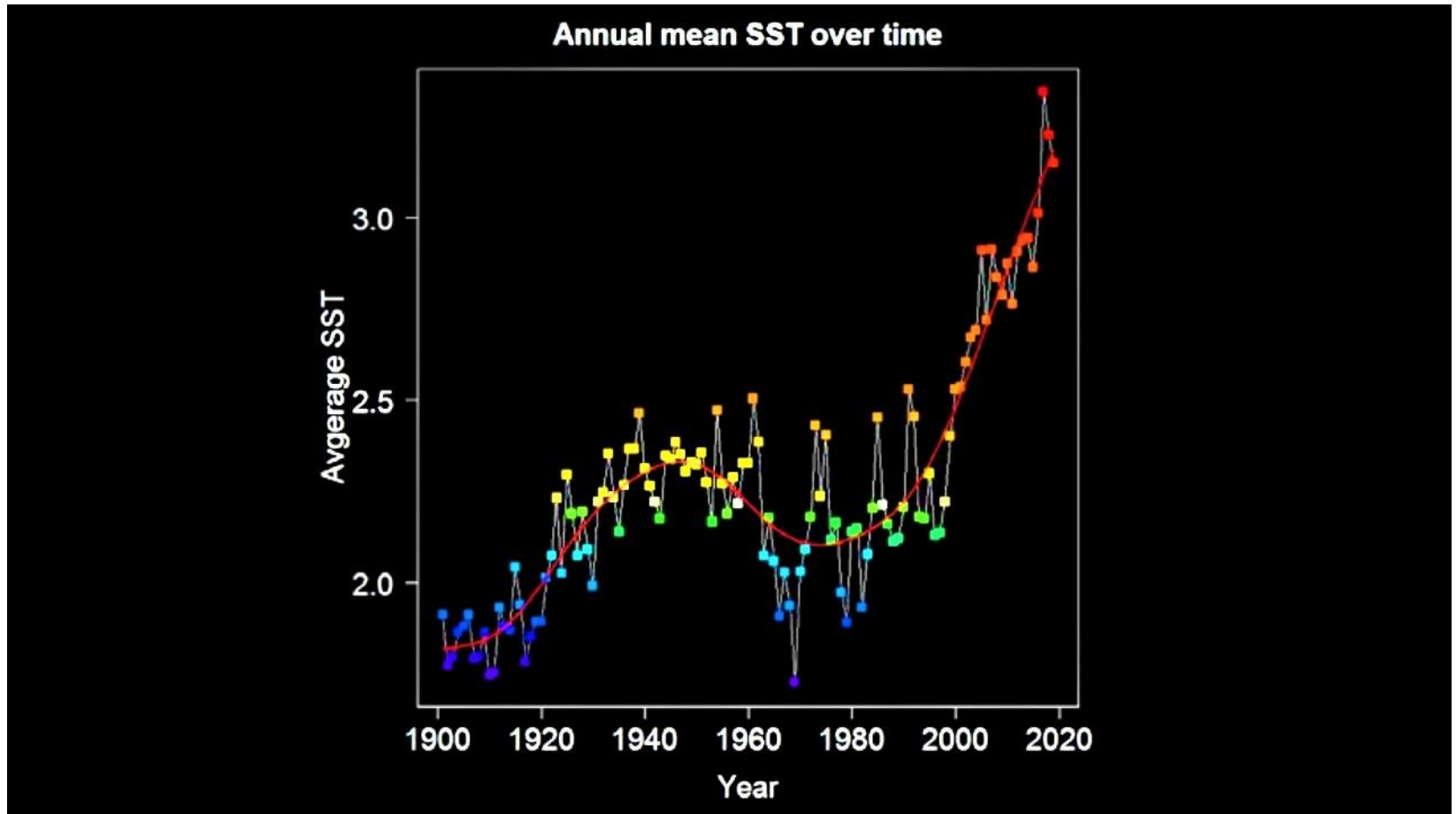


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## Scottish stock status



## Salmon habitat in N Atlantic and Barents Sea: Sea surface temperature





# Salmon like it cold:

What hope is there as warming increases?

- Further changes in the marine ecosystem may be more favourable for salmon
- Animals can adapt (evolve) (within limits)
- Climate change may be brought under control
- Perhaps there is a different main driver than climate change

## General strategy

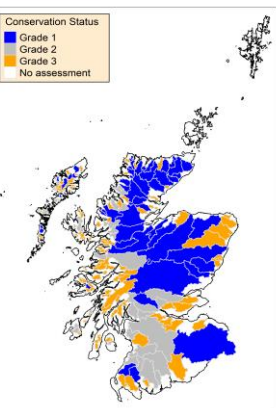
1. Protect and enhance numbers and quality of salmon smolts leaving Scottish waters  
  
(to compensate for decline and buy time)
2. Verify causes of mortality and poor growth on the high seas



## Stock status and monitoring

- Monitor salmon and sea trout stocks around Scotland based on fisheries catch data supplemented by fish counters.
- Monitor salmon at two trap sites on the Aberdeenshire River Dee.
- Monitor sea trout at an instrumented trap site at Shildaig on the west coast.
- Monitor numbers of eels across the trap sites.
- Develop a national network of salmon counters.
- Monitor lower river and marine survival of salmon using PIT tag systems on the Rivers Conon and Awe.





# Salmon conservation regulations



**Collect biological information on adult salmon (size, sex, fecundity, incidence of red vent).**

- Combine abundance data with other biological information to derive salmon conservation status for rivers as part of Salmon Conservation Regulations to control killing of salmon (by anglers and nets).
- Develop tools for assessing salmon conservation status at a sub-river scale.
- Update methods used for determining conservation status.
- **Develop an electrofishing approach to use juvenile salmon abundance to estimate salmon conservation status (NEPS).**

# Aquaculture and interactions with freshwater fisheries

- Conduct monitoring and experimental work to assess levels of sea lice and investigate how sea trout use their environment.
- **Model and monitor dispersal of salmon through the coastal zone.**
- Produce models of sea lice and disease dispersal to provide epidemiological advice for aquaculture planning.
- Conduct research on gill disease in farmed salmon.
- Assess impacts of climate change on aquaculture
- **Introgression**

## Major advice and licensing streams

- Advise on fish farm planning, control of seals and fish-eating birds, impacts of beavers and non-native species, such as pink salmon and signal crayfish.
- Licence applications to stock fish, take brood-stock and use otherwise illegal methods for capturing fish.
- **Contribute to the Aquaculture Fish Health Framework process, including development of new scientific approaches for developing fish farm planning.**
- Advice to SEPA etc- eg Fisheries Committee, FW TAG
- General advice to policy colleagues



## National- International Advice Streams

- **Contribute to ICES groups assessing salmon, sea trout, eels and aquaculture impacts from sea lice.**
- **Assist in linking national to international salmon management through ICES and North Atlantic Salmon Conservation Organisation**
- **Sit on NERC's Special Committee on Seals.**

## Outreach and networking

- House the Scottish Fisheries Co-ordination Centre.
- Game Fair, Open Day etc

## Processes and impacts

EG Examine effects of temperature, flow regime, stocking and water chemistry on production of salmon, including addition of nutrients.

## Official statistical publications

Produce annual aquaculture production and salmon and sea trout rod catch statistics.

# Predators



- Further develop the scientific knowledge base for assessing impacts of fish-eating birds.
- Develop an effective scarer system to keep seals out of rivers
- Pilot work to assess interactions with dolphins



## Climate change response

- Provide a mapping tool to predict river temperatures across Scotland, supported by a network of temperature loggers, and expand to support riverine tree-planting to protect from local warming due to climate change.
- Further develop isotopic analysis of otoliths to predict distributions of salmon on the high seas

